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ABSTRACT

This publication is a part of a series of materials in the Wildlife Education Service for Kansas youth series. The goal of the program is to provide information about wildlife and to establish in children an awareness and appreciation of wildlife. A booklet for children and a teacher's guide are included. The booklet was written for fourth-grade children but can be easily adapted for other grades. The materials are designed for multidisciplinary use. The teacher's guide includes the following materials: (1) an introduction and foreword; (2) an opinionnaire about the materials; (3) a student award form; (4) ideas for classroom bulletin boards; (5) reproducible worksheets for students; (6) supplemental activities and approaches for language arts, science, art, industrial arts, mathematics, social studies, music, and physical education; and (7) appendices which list resources and references, and includes a glossary of terms used in teaching this topic. (CW)

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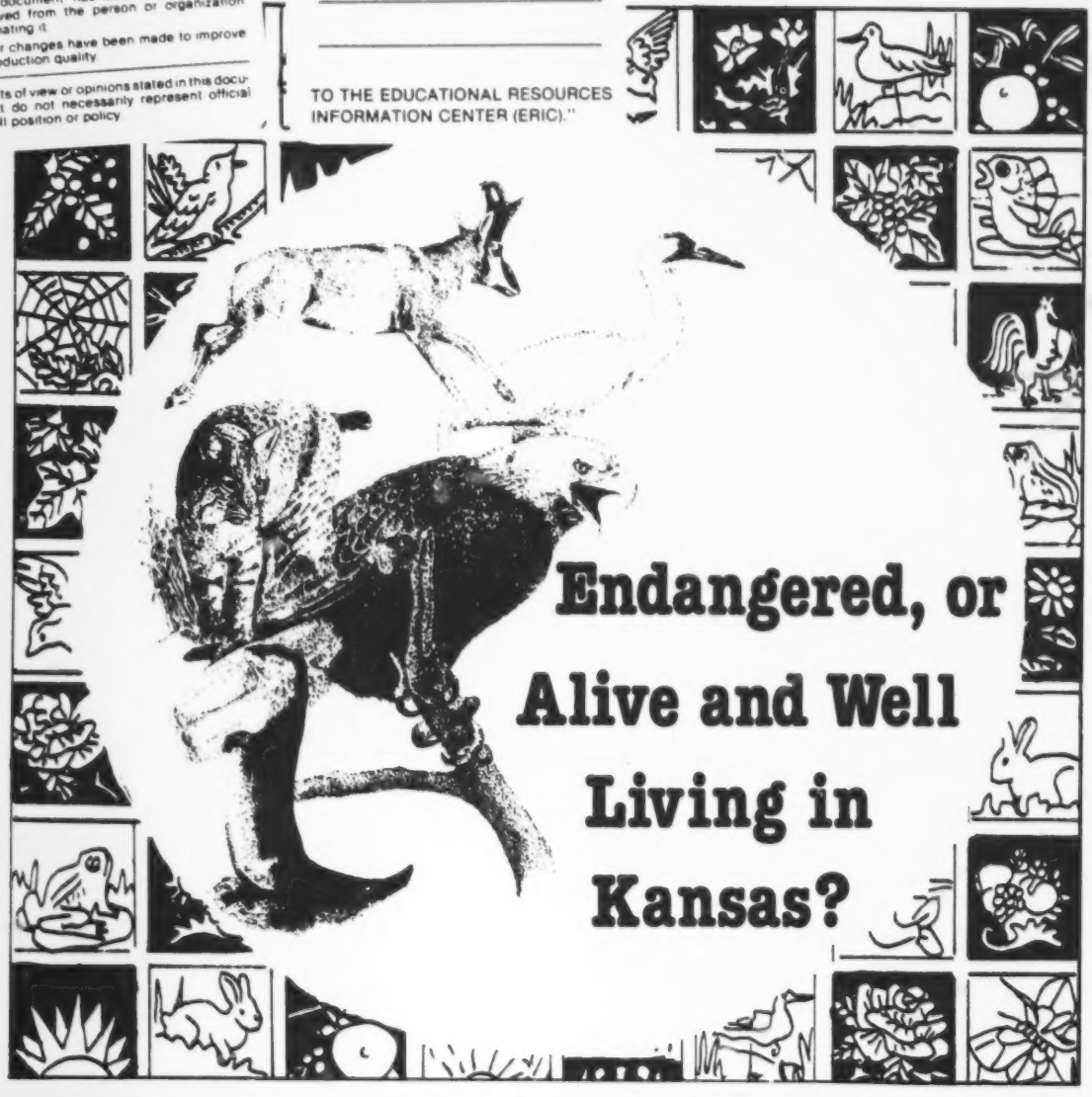

Endangered, or Alive and Well Living in Kansas?

Teacher's Guide

wildlife education service

KANSAS FISH AND GAME

SE05155T

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Teacher's Guide

Endangered, or Alive and Well Living in Kansas?

Comprehensive Program Written and Developed by

Joyce R. Harmon

Wildlife Education Coordinator

Design and Illustration by

Mike Miller

With special thanks to Debbie Schmidt and Alan Baccarella

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KANSAS FISH AND GAME

A series of wildlife education materials for Kansas youth from Kansas Fish and Game

THIS MATERIAL IS DEDICATED TO THE CHILDREN OF KANSAS;
MAY THEY KNOW A LOVE OF WILDLIFE.

Funded by hunting and fishing license fees and the
Nongame Wildlife Tax Check-Off Program

Wildlife Education Service
Kansas Fish and Game Commission
Box 54A Route 2
Pratt, Kansas 67124

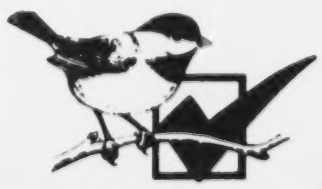

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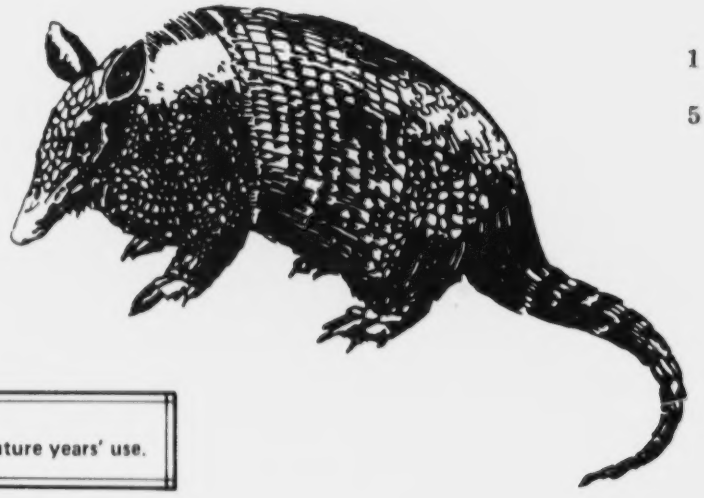
Table of Contents

	Page
Introduction	2
Foreword	3
Opinionnaire	4
Student Award	5
Bulletin Board Idea	6
Worksheets	7
Supplementary Activities and Approaches	
Language Arts	32
Science	34
Art	35
Industrial Arts	36
Mathematics	37
Social Studies	39
Music	41
Physical Education	41
Etc. — Appendix	
Resources and References	1
Glossary	5



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Introduction

ENDANGERED, OR ALIVE AND WELL LIVING IN KANSAS is part of a series of materials in the Wildlife Education Service for Kansas youth from Kansas Fish and Game Commission. (See inside cover of the student booklet for other titles.) The materials are designed for use by teachers. The goal of the program is to provide information about wildlife and to establish in children an awareness and appreciation of wildlife. This booklet was written for **fourth grade** but can be easily adapted for other grades. The study of wildlife need not be limited to science class but should be multidisciplinary. Enrich your existing curricula with this material.

You do not have to be a biologist or wildlife expert to teach about wildlife. The Wildlife Education Service materials were written for anyone who has an interest in teaching children about wildlife and the environment. The worksheets and activities in the teacher's guide reinforce information in the student's booklet. Do any quantity or combination of activities and worksheets that are appropriate for your schedule. The lessons may be used as a unit of study or used throughout the year when time allows. The worksheets may be done in whatever sequence you choose.

ONE set of each grade's materials will be provided to each school to be shared among the teachers at that grade level. Maintain these materials for future year's use. This is a master copy. Replacements are not available. The materials may be reproduced if additional copies are needed or you choose to have copies for students to take home.

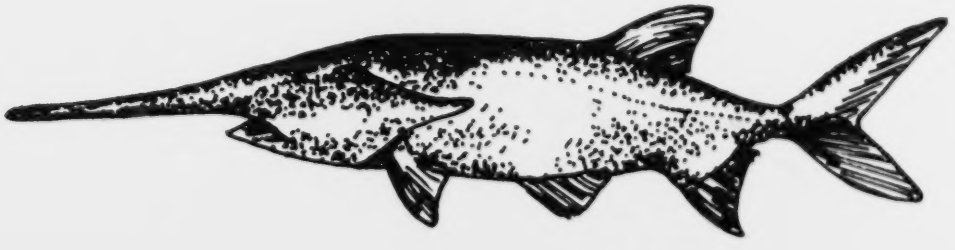
The Fish and Game Commission has a Wildlife Reference Center located at the Pratt headquarters. The center includes films, filmstrips, slide series, games, posters, books, and other wildlife-related material available to schools on a free-loan basis. Return mail cost is the only expense to the school for use of this material. Refer to your Wildlife Reference Center catalog for materials appropriate to your study. Especially recommended for use with this booklet are: M-8, A Great White Bird; M-31, The American Bald Eagle; M-69, We Can Save the Eagle; FS-1B, Endangered Species; FS-21, Unendangered Species; FS-26, We Care About Eagles; SS-22, Rare and Endangered Animals; FS-24, The Lorax; 14-9, Teaching About Endangered Species; FS-2, World of Endangered Wildlife; FS-28, What They Say About Hunting; and 14-10, Endangered Species Packet. Be sure to check your Wildlife Reference Center catalog for other materials. A catalog has been sent to each school district office. Please contact your administration office for your district's copy. Orders will be filled on a first-come, first-served basis, so we suggest sending your requests in early.

To be effective, material must be used. This format was written to be easy to use, ready to use, and flexible. Little additional preparation or equipment is required. The most important ingredients for success in your lessons will be your enthusiasm and imagination. Technical references can be obtained from the Wildlife Reference Center or your local library.

The material is appropriate throughout Kansas, no matter what size community or region of the state you live in. It is not necessary to have a natural area near your school; use whatever is available. Many of the supplementary activities can be done on the schoolgrounds or in the classroom.

This program was funded by hunting and fishing license fees and, in part by the Nongame Wildlife Tax Check-off Program.

Remind your students that when they are outside they are company in the homes of wildlife; therefore, their best manners should be used.



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Foreword

In the time I have spent in Kansas, I have learned to appreciate the state that was once described as the great American desert. Kansas remains one of the better-kept secrets in the United States. The diversity of climate, terrain, and vegetation provides for a variety of wildlife. Use these attributes to the fullest in your classroom. Students are already interested in animals; tap that interest in all curricula areas by exploring what Kansas wildlife has to offer. Wildlife is a basic now more than ever. People, especially children, need to be more aware of wildlife and how their actions affect wildlife. The future of wildlife depends on actions we make today. Educate our young people to care about their future and the future of wildlife.

Please direct any questions or comments concerning the Wildlife Education Service materials to me at the Pratt headquarters. Good luck for a successful and exciting learning experience.

Joyce Harmon

Joyce R. Harmon
Wildlife Education Coordinator
Kansas Fish & Game Commission
RR 2 Box 54A
Pratt, Kansas 67124

A true conservationist is a man who knows that the world is not given by his fathers, but borrowed from his children. —*John Madson*

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Opinionnaire

Your input is important in continuing and improving this program. Any comments or ideas you want to share would be appreciated. Please make a copy of the opinionnaire below and complete it or send your suggestions on a separate sheet to:

Joyce R. Harmon, Wildlife Education Coordinator
Kansas Fish and Game Commission
RR 2 Box 54A
Pratt, Kansas 67124

Title of unit_____ Grade you teach_____
School district_____

The materials were:
_____ very useful _____ moderately useful _____ of no use

Students were:
_____very interested _____moderately interested _____not interested

The materials were appropriate for the grade you teach. ( ) yes ( ) no
(if no, list more appropriate grade)_____

Rank each of the following components on a scale of 1 to 5 based on their value for your use. (1 represents highest grade; 5 represents lowest grade)

_____ student booklet
_____ bulletin board idea
_____ student award
_____ worksheets
_____ supplementary activities & approaches
_____ glossary
_____ resources & references
_____ Wildlife Reference Center

List favorite worksheet (s) or activity (ies)

List curricula areas where you used the material

Approximate amount of time (hours, days) spent using the material

Changes you would recommend. Please be specific.

Other comments

Thank you for your time and effort.

7

After students have successfully completed their study of this aspect of wildlife, award their progress. Copies can be made of this award and presented to them at the end of your unit of study.

Wildlife Awareness Award

IS PRESENTED TO

_____
name

For outstanding progress shown in the study of Kansas Wildlife

on _____ at _____
date school

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_____
signed

motif by Daisy Baughman

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Bulletin Board Ideas

Save Poetry From Extinction

Poetry may be in danger of becoming extinct from lack of use. A creative writing assignment that doubles as a bulletin board can be done easily by having students write free verse, cinquains or haikus about endangered or unendangered wildlife. (Research can be done to add to the descriptive phrases.) Rhyming is not important.

The formula for a cinquain is:

1st line	2 syllable title
2nd line	4 syllables (description of title)
3rd line	6 syllables (description of action)
4th line	8 syllables (description of feeling)
5th line	2 syllables (synonym for the title)

To make it easier, just require correct syllables in lines and eliminate part in parantheses.

An example of a cinquain:

Least tern
small, threatened bird
moves by rapid wingbeats
yellow legs love sandy beaches
Sterna

(Sterna albifrons is the genus – species, or scientific name, of the least tern. Scientific names are used to reduce confusion because some animals have many common names.)

Haiku formula:

1st line	5 syllables
2nd line	7 syllables
3rd line	5 syllables

An example of haiku:

Peregrine falcon
DDT hit hard
large, endangered, cliff-nester
caught prey in fast flight

FEATURE CREATURE

Feature a different threatened or endangered species every month. Include pictures and information about this animal. Have students do further research on the animal to be shared with the rest of the class.

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TEST YOUR ENDANGERED WILDLIFE IQ

Directions: Tests should be given before and after this unit is taught. Compare the test results to measure improvement.

Put a "T" by those animals that you think are threatened and an "E" by those animals you think are endangered in Kansas (lists vary by state). Leave other names blank.

_____ Bluegill
_____ Mule deer
_____ Gray bat
_____ Cave salamander
_____ Coyote
_____ Sandhill crane
_____ Beaver
_____ Peregrine falcon
_____ Whooping crane
_____ Great blue heron
_____ Riffle beetle
_____ Ring-necked pheasant
_____ Swift fox
_____ Least tern
_____ Bald eagle
_____ Muskrat
_____ Channel catfish
_____ Topeka shiner
_____ Warty-backed mussel
_____ Black-footed ferret
_____ Blue sucker
_____ Grotto salamander

_____ Eskimo curlew
_____ Prairie falcon
_____ Canada goose
_____ Wild turkey
_____ Neosho madtom
_____ Bobwhite quail
_____ Lesser prairie chicken
_____ Central newt
_____ Bobcat
_____ Sicklefin chub
_____ Heel-splitter mussel
_____ Pallid bat
_____ Barn owl
_____ Bison
_____ Kangaroo rat
_____ Black-tailed prairie dog
_____ Porcupine
_____ Arkansas darter
_____ Northern crawfish frog
_____ Walleye
_____ Alligator snapping turtle
_____ Pallid sturgeon

NAME _____

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THE SWEET 16 OF KANSAS

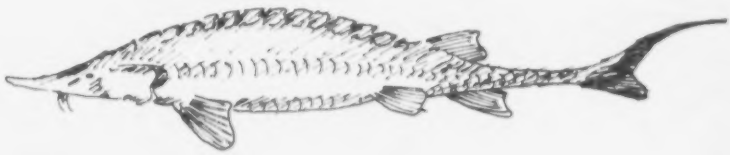
Below is a list of the sixteen endangered species and the eight threatened species in Kansas (1984 list). Divide the list into animal groups by writing the appropriate letter behind the name. B for birds, M for mammals, F for fish, R for reptiles, A for amphibians, and I for invertebrates.

Endangered

Neosho Madtom
Black-footed Ferret
Grotto Salamander
Sicklefin Chub
Eskimo Curlew
Pallid Sturgeon
Central Newt
Bald Eagle
Gray Bat
Heel-Splitter Mussel
Pomatioposis lapidaria (snail)
Peregrine Falcon
Cave Salamander
Warty-backed Mussel
Whooping Crane
Graybelly Salamander

Threatened

Prairie Falcon
Riffle Beetle
Arkansas Darter
Alligator Snapping Turtle
Least Tern
Blue Sucker
Topeka Shiner
Northern Crawfish Frog



How has this list changed since you were born?

How long has each been endangered?

Name the law(s) that protect these animals.

Besides laws, what has been done to help these animals? Do you think these activities will be helpful? Who contributes money to the efforts?

NAME

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On a map of Kansas or of the United States, mark the present and past ranges for these species. An animal's home range is the area in which the animal lives.

What are the chances of survival for these animals? Choose one or two species to research.

Why are they endangered? Research one or two species.

List any Kansas species that are no longer on the endangered species list (either became extinct or are no longer endangered).

What does the possible extinction of these animals mean to you? Are you affected in any way? What contributions does this species make to the ecosystem, medicine, economics, or human enjoyment? (Choose one or two species.)

How do you think people would react if buffalo were adapted to city life like squirrels and doves?

What can you and your classmates do to help these animals? Check the last page of the booklet *"Endangered, or Alive and Well Living in Kansas?"* for ideas.

What state or federal agencies are responsible for managing endangered and threatened species?

Write a letter to the U.S. Fish and Wildlife Service (Department of the Interior, P.O. Box 25486, Denver Federal Center, Denver, CO 80225) or the National Wildlife Federation (1412 16th St. NW, Washington, D.C. 20036) and ask for more information about endangered species. Find other groups and organizations you can write to and express your opinions.

How would a good land-use plan help slow down or stop further loss of species?

Write a sentence or two that summarizes the problems endangered species are facing and why the situation exists.

NAME _____

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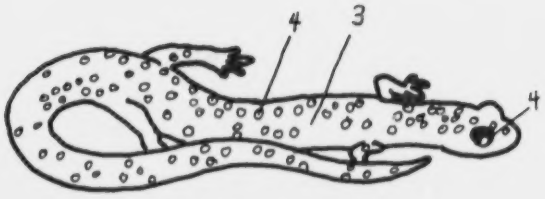
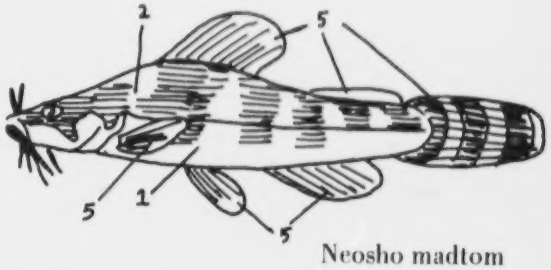
painter's pallet

Directions: Color some of the endangered wildlife species of Kansas by following the key below.

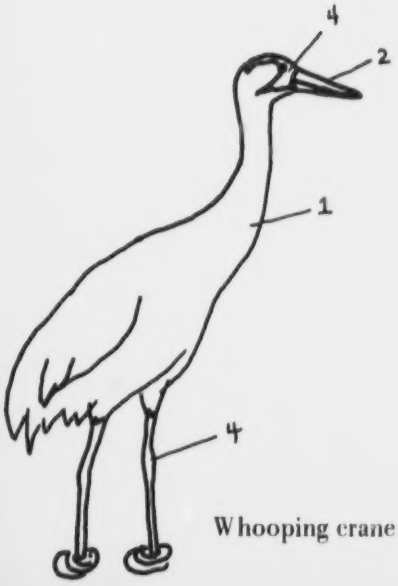
1 = white	5 = gray
2 = brown	6 = red
3 = orange	7 = pink
4 = black	8 = yellow



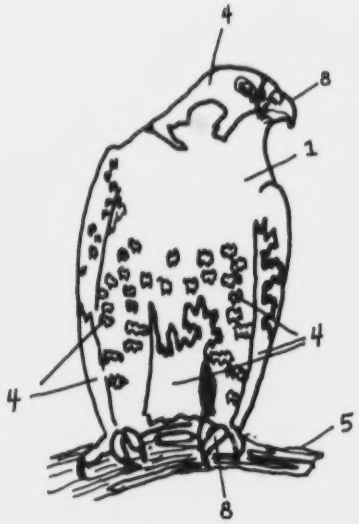
Cave salamander



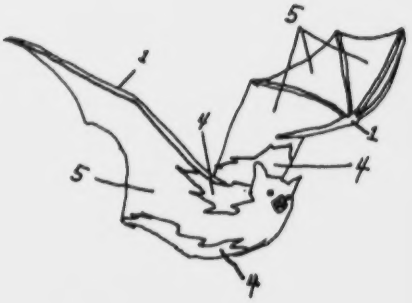
Neosho madtom



Whooping crane



Peregrine falcon



Gray bat

NAME _____

14

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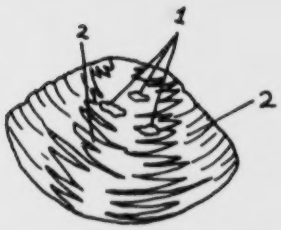
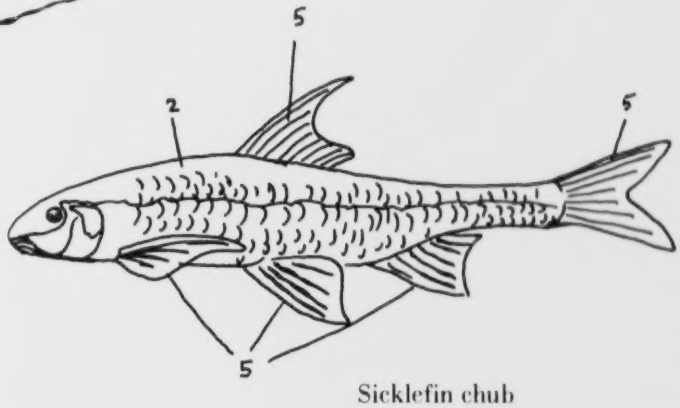
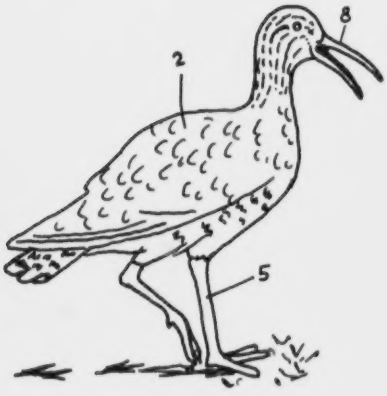
Black-footed ferret



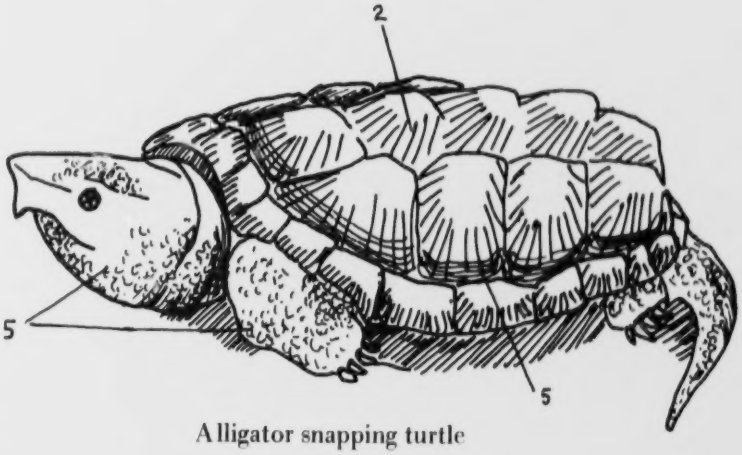
Warty-backed mussel



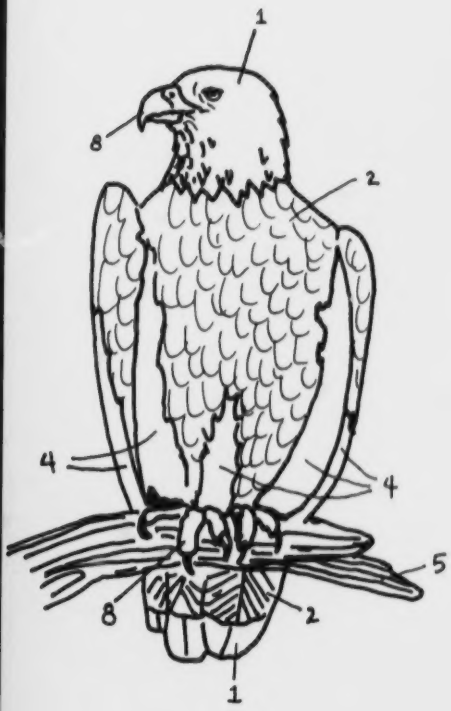
Sicklefin chub



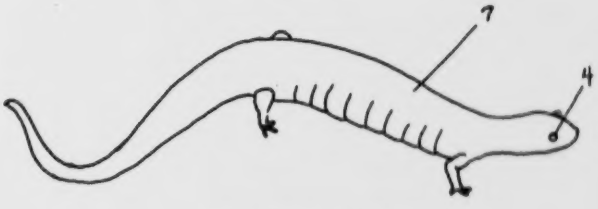
Eskimo curlew



Alligator snapping turtle



Bald eagle



Grotto salamander

NAME _____

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DESIGN AN UNENDANGERABLE SPECIES

You have read about some endangered species and species that are not endangered. Species become extinct if they don't adapt to the changing environment. See how well you can design an animal that would adapt to life in the United States today.

Keep in mind the reasons animals have become endangered or extinct: loss or change of habitat, competition with other species, pollution, and uncontrolled harvest. Considering these factors, fill in the chart below to create four new animals. An example has been done for you. Answer the questions on the following page for the animal of your choice.

	Habitat	Enemies	Food	Behavior
Animal 0	Edge of prairie and cropland	hawks, owls and coyotes	plants - especially wheat & milo, or small insects	lives in group. fast runner, can get some of its needed water from plants
Animal 1	Prairie			
Animal 2	Forest			
Animal 3	Marsh			
Animal 4	Rivers, Lakes or Reservoirs			

NAME _____

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Name of species

Size (height, weight, length, etc.)

Speed of movement

Body covering

Color

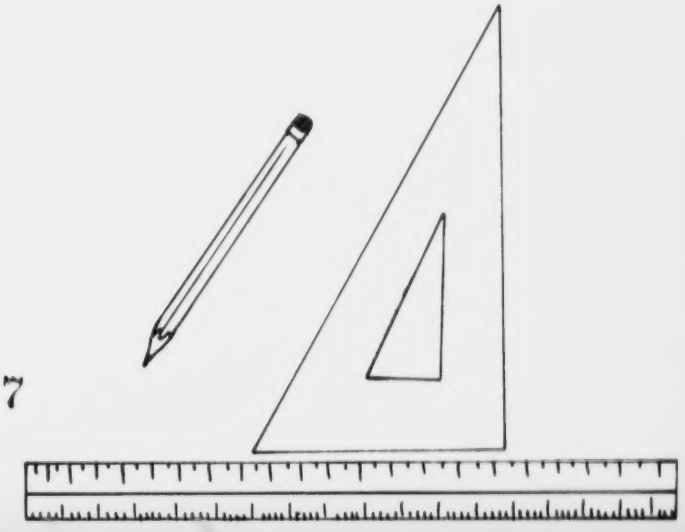
Method of communication (makes sounds or other means)

Adaptations special for habitat, defense, food gathering, etc.

Unique behavior and habits (Put a star by those that are especially helpful for survival.)

What changes in our environment would cause this animal to become endangered. What changes would help cause an over-population?

On this page or on a separate piece of paper, write a short story describing what life is like for this animal. Include information about how this animal gets along with people and the things we do to the environment. Draw a picture of your animal.



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ENDANGERED, OR ALIVE AND WELL?

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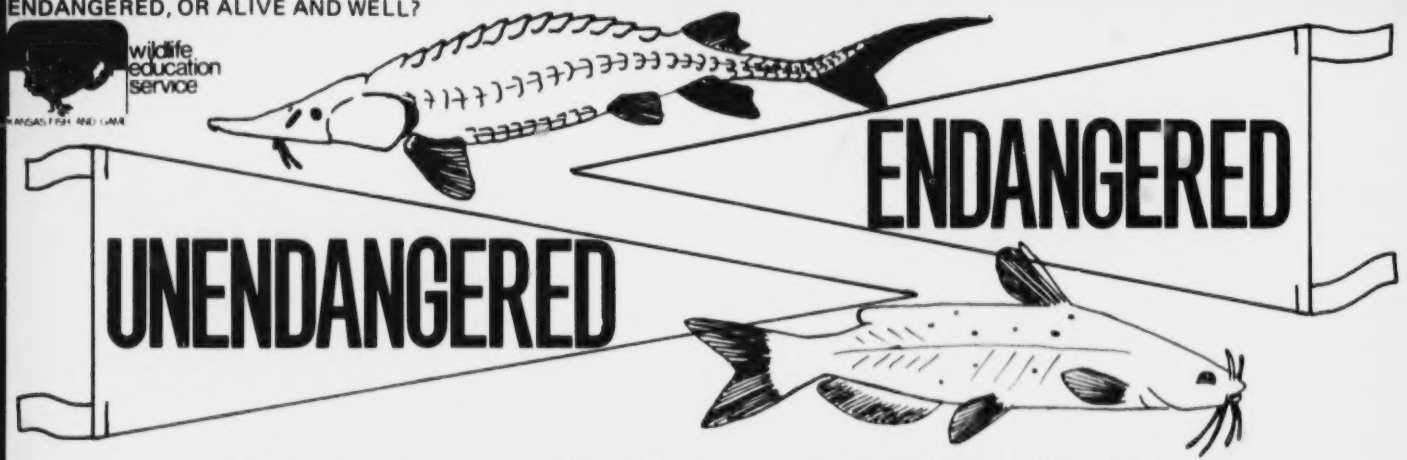
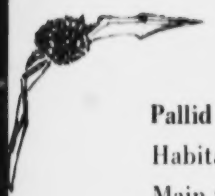


Below are pairs of animals. One of the pair is an endangered species, the other is NOT endangered. Circle the endangered species and complete the information below for each species. Choose one of the pairs and compare them in more detail. Why do you think one is endangered and not the other?



Pallid Sturgeon

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Channel Catfish

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Brown Bat

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Gray Bat

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Whooping Crane

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Sandhill Crane

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Raccoon

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

Black-footed Ferret

Habitat _____

Main food _____

Predator or Prey _____

Game or Nongame _____

18

NAME _____

ENDANGERED, OR ALIVE AND WELL?

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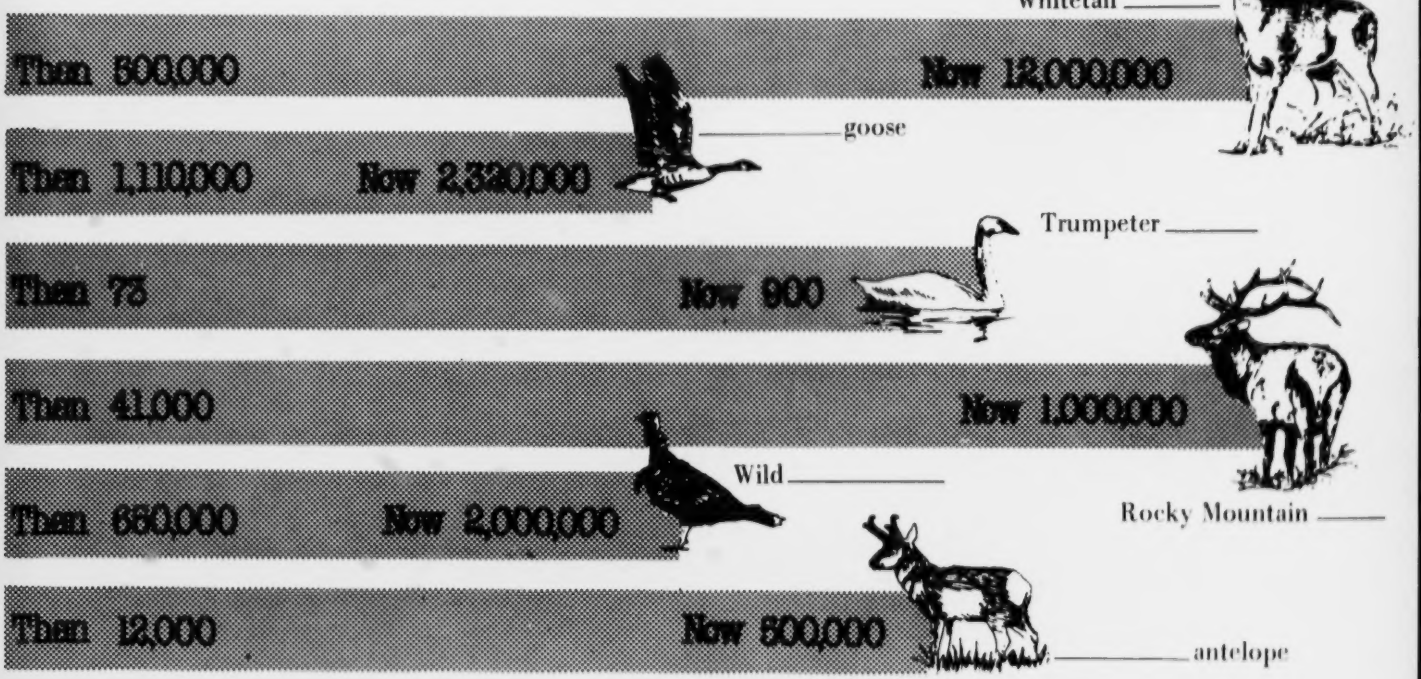
THE BUCK STOPS HERE

Sportsmen have taken more than their share of the blame for wildlife destruction, when, in fact they pay more than their share to support wildlife. About $8 billion is paid each year by sportsmen to support wildlife and natural resource programs.

Since the turn of the century, some wildlife populations have made great progress. Read the chart below to see the changes that can be made. Complete the animal's name in the blank provided. Place an "X" near all species that live in Kansas.



Use the chart to answer the following questions.

1. Whitetail deer have increased by approximately what amount since 1900? Show your work.

2. Which species has increased the most in number?

3. What percentage of the current trumpeter swan population did we have in 1935?

4. How many more Canada geese do we have than wild turkeys?

5. Biologists estimate that Kansas has 1900 pronghorn antelope. What fraction of the total U.S. population is that?

6. How many mammals does this chart currently represent?
   How many birds?

NAME _____

Chart adapted from "Un-Endangered Species", NSSF, Riverside, CT.

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ARE VOWELS EXTINCT?

Directions: Add the missing vowels to the consonants below to form names of many endangered and threatened species in Kansas.

NSH MDTM

BLD GL

PRGRN FLCN

I

GRY BT

BLCK-FTD FRRT

CV SLMNDR

PLLD STRGN

A

SKM CRLW

GRTT SLMNDR

U

WRTY-BCKD MSSL

HL-SPLTTR MSSL

WHPNG CRN

GRY-BLLD SLMNDR

SCKLFN CHB

CNTRL NWT

LST TRN

PRR FLCN

RKNSS DRTR

E

RFFL BTL

TPK SHNR

O

NAME _____

20

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KANSAS FISH AND GAME

CAUTION: ENGLISH SKILLS ENDANGERED

Directions: Circle all of the punctuation and spelling errors in the paragraphs below. Rewrite the paragraph with corrections on the back of this worksheet or on a separate piece of paper.

And Then there Were None

By the year 2000 many anamals may onli be found in zoos? habitat can not always be savd so, zoos may be one place some species can survive. Some endangered specyes have been helped when scientists brought them into controlled areas Young are raised in captivity and then released into hte wild. zoos may save somee very special animales from extinction,

ShaRing the Earth

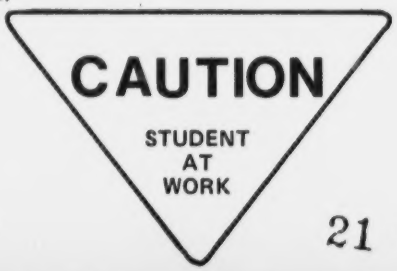
As humen populations have grown the demand on the earth has incraesed. the places that weer once homes for wildlife are know homes four people Unless people become more concerned about wildlife and habitat the united states will knot be anel to support the wildlife we now have. We musted learn to share the wourld with wildlife!

history of endagerd species

when colonistes 1st arrived in the new world they found a abundance of wildlief. however, sum species soon begun to dissappear as land were cleered and Natural habitats was distroyed The widespread Killing of games specie to supplie restaraunts and Market in large citys contribeled too the decline, as done the comercial exploitaton of Some species for fur feathers and material for jewlry?

concern about the futere of some animals begin to grew at teh begining of the 20th Century. The lacey act made it a federal violation to ship Illegally Killed birds and othor anemals acros state lines? in 1903, floridas pelican island was set aside by president theodore roosevelt as the nation's first national wildlife refugee. State and fedural laws Designd two protect plantes and animales become more common.

All living things – humans included – need adequate food water air and shelter in order to survive As the activitys asociated with an growing antiona began to effect the natural environment adversely, some species begane two decLine sew rapidly that there survivel was Endangered. federal and state Laws now exist too protect endangered species or species that Myght become endanger ed in the near future.



NAME _____

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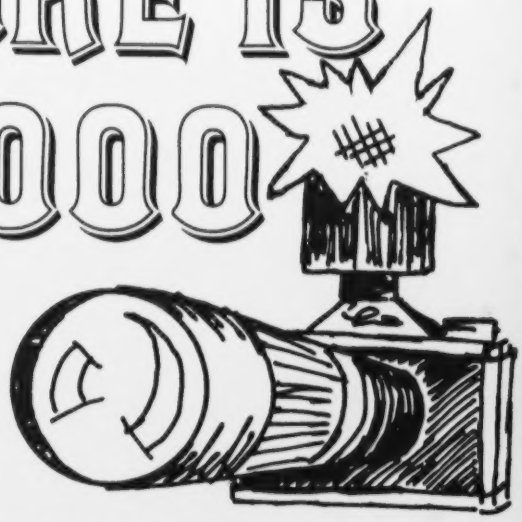
ONE PICTURE IS WORTH 1,000 WORDS



You have been given a camera that is able to take photographs of the past, present, and future. Show what the view from your window would be on each of the dates below. A **cutline** is written information that goes along with a photograph or illustration. Write a cutline for each photograph in the space provided.

1,000 years ago

_____

_____

_____

200 years ago

_____

_____

_____

NAME _____

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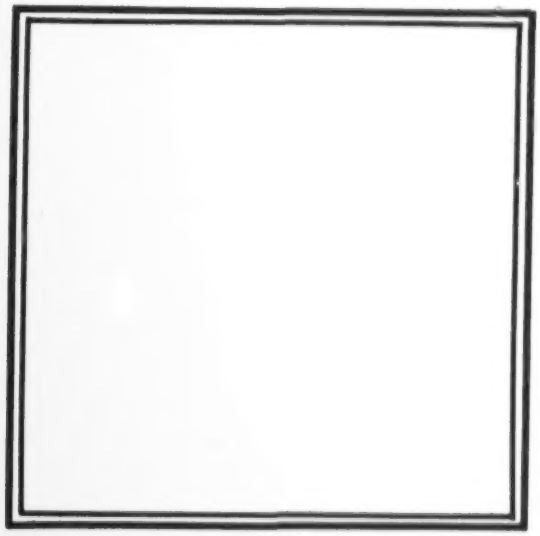
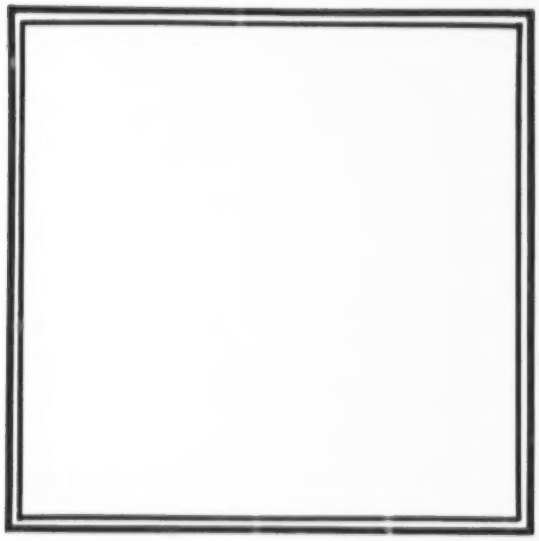
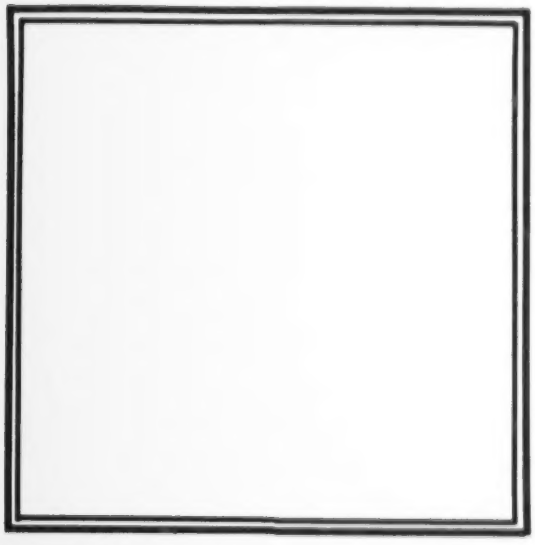
KANSAS FISH AND GAME



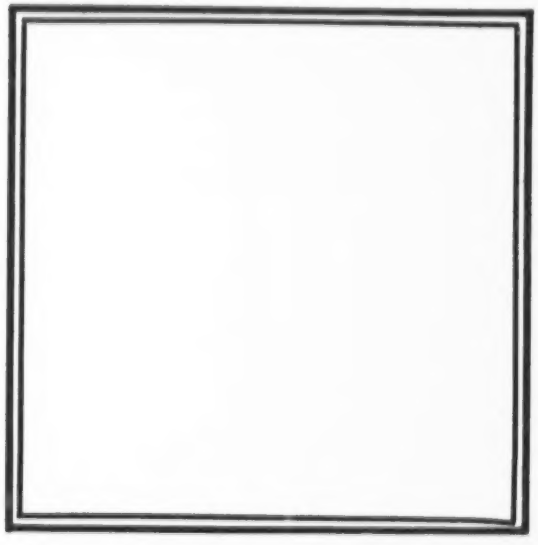
25 years ago



Today



10 years from now



250 years from now

Describe the changes:

Photographs by _____

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KANSAS FISH AND GAME

E is for

ecological expressions

Directions: Given the following words, complete the exercise below. You may use a separate sheet of paper for your answers.

estivate	exotic	emu	echidna	eel
eagle	entomology	ermine	eider	environment
egret	echolocation	ecology	extinct	experiment
eddy	earth	elk	eaglet	ecosystem
edentate	endangered	egg	estuary	eland
echinoderm	earth science	edge effect	extirpated	erosion

1) Place the words in alphabetical order. Divide the words into syllables. Double check your work.

2) Look up each word in your dictionary. Write the word, its pronunciation, part of speech, meaning(s), and the guide words found on the dictionary page. Use the word in a sentence. The first one has been done for you. (Note: Dictionaries will vary in pronunciation keys.)

estivate (es' tə vāt'), verb 1. to spend the summer, as at a specific place or in a certain activity. 2. to pass the summer in a torpid condition. (also spelled aestivate.)
guide words: essentialist Estremadura
Some desert animals estivate in the summer to save energy.

3) Write at least five sentences using two or more of these words in each sentence.

The bald eagle is endangered because poisons in the environment caused the egg shells to be weakened.

4) Complete the following sentences using the words above.

Bats use a special radar called _____.

An arm of the sea at the lower end of a river is a/an _____.

An _____ species no longer exists.

_____ and _____ are adult birds that live in Kansas.

5) List all the words that name an animal or group of animals.

6) Write the correct word for each respelling.

ē'-lənd	ent'-ə-mäl'-ə-jē
ē'-myü	es'-chə-wer'-ē
eg'	in-vī'-rən-mənt
ēl'	i-kol'-ə-jē
ər'-mən	ik-sper'-ə-mənt

7) Unscramble these words.

gtalee	yeoolgc	gdnedeeanr
ysrutea	mycssoeet	oooyetlmng

NAME _____

24

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KANSAS FISH AND GAME

NOAH'S ARK -100-

It is the year 2,000 A.D. and you have received word that an animal transport named "Noah's Ark 100" will be arriving soon. It is your task to assign 50 pairs of wild animals to board the transport. You'll want to select representatives from across the state of Kansas. Consider the variety of Kansas habitats, the many groups of animals (birds, insects, fish, etc.), what life will be like in the area you are transported to, what factors make up a balanced food chain, and how each species fits into the environment.

List your 50 pairs below. On the back of this paper or on your own paper write about your animal community and life on "Noah's Ark 100." Describe what the environment is like in the year 2,000. How many currently endangered species did you include in your list? Include a food pyramid or food chain diagram in your description so the predator-prey balance of your community can be checked. Are people included in your community?

NAME _____

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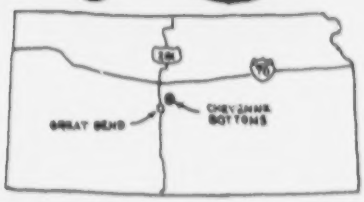
KANSAS FISH AND GAME

THE DECISION IS UP TO YOU



You are the wildlife manager of the Cheyenne Bottoms Wildlife Area in central Kansas. This marsh is a concentration point for waterfowl and other wildlife species. Consequently, it is an area of heavy use from waterfowl hunters and bird watchers.

It is spring and you are faced with the major dilemma of leaving one of the pools (See map. You decide on the pool.) partially drained for use by a nesting least tern, a threatened species of bird.

The following facts need to be considered in making your decision.

* The only water the wildlife manager can count on for filling the marsh comes in the spring. Water in the refuge areas is valuable to hold waterfowl in the area for a longer period of time during hunting season.

* High spring water levels are good for waterfowl (ducks, geese, etc.). Low spring waters are good for shorebirds and the threatened least tern.

* High water levels keep too many cattails from growing. Too many cattails can ruin a marsh for many wildlife species.

* If you lower the water level now, you may not be able to fill the marsh later in the summer. The only available water is from rainfall and stream runoff. So, you gamble on the weather.

*Hunters' license fees bring in most of the funds to manage this area.

*Nongame Tax Checkoff funds provided an observation tower for viewing wildlife in the area.

* The previous hunting seasons were poor due to drought. There's a great deal of pressure from hunters and your supervisors for a successful hunting season.

* The number of birdwatchers is not nearly as large as hunters. They, however, are very eager to have the threatened least tern in the area and thoroughly enjoy observing birds.

* Birdwatchers know the Fish and Game Commission is responsible for all wildlife, not just ducks. They want the marsh managed for nongame (those animals that are not hunted, fished or trapped).

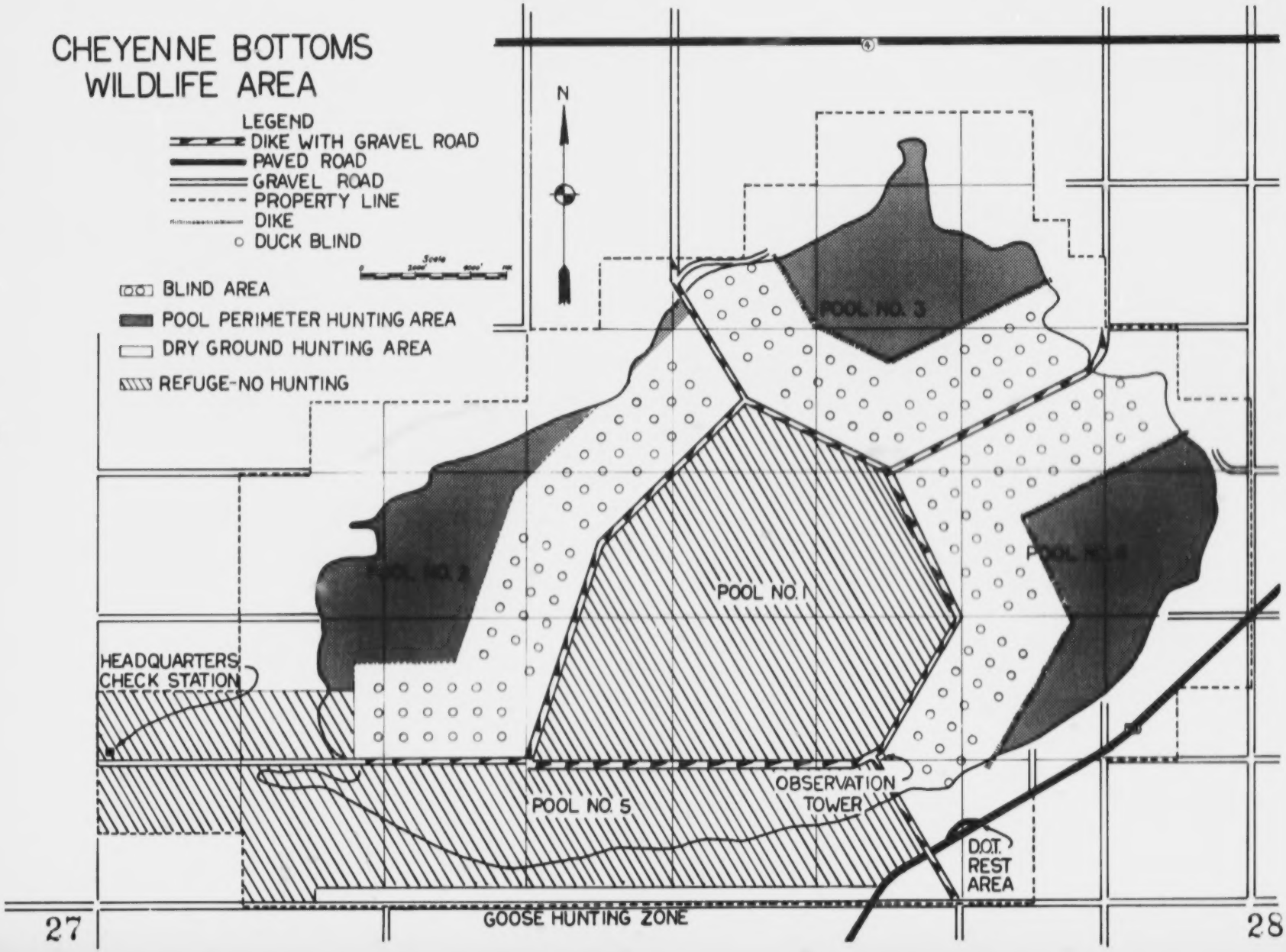
* There are five pools in the marsh. You can manage water levels in each pool separately.

Should you guarantee a reasonable duck season by holding spring waters, or should you release spring waters to provide shorebird and least tern habitat? State your answer and a defense of your answer. Be aware that some people may be active in both groups.

Panels can be formed to represent the two groups. The wildlife manager's talk and response from the organizations measures the manager's effectiveness.

NAME

Use this map of Cheyenne Bottoms to make your management plan.



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KANSAS FISH AND GAME

"Quota of Quotes"

A **quote** repeats what has been said or written. Quotation marks are placed around quotes to give credit to the author. Several people have written or spoken statements about the environment. Listed below are a few quotes which talk about people and the environment. Write a short biography about each author, then restate their comment in your own words. Try your hand at writing quotable wildlife sentences.

"There are some who can live without wild things, and some who cannot. Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher 'standard of living' is worth its cost in things natural, wild, and free. For us in the minority, the opportunity to see geese is more important than television, and the chance to find a pasque-flower is a right as inalienable as free speech."

Aldo Leopold,
A Sand County Almanac

"When one tugs at a single thing in nature, he finds it attached to the rest of the world."

John Muir

"If future generations are to remember us more with gratitude than with sorrow, we must achieve more than just the miracles of technology. We must also leave a glimpse of the world as it was created, not just as it looked when we got through with it."

Lyndon B. Johnson

"Unless someone like you cares a whole awful lot, nothing is going to get better."

Dr. Suess, *The Lorax*

"We are all environmentalists. If we care about the quality of the life we lead, about human values, we're environmentalists. This is an awareness and a commitment of the heart as well as of the mind."

Robert Redford

"He who knows what sweets and virtues are in the ground, the waters, the plants, the heavens and how to come at these enchantments, is the rich and loyal man."

Ralph Waldo Emerson

"We need the tonic of wildness . . . At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild . . . We can never have enough of nature."

Henry David Thoreau, *Walden*

"Before many years the Buffalo, like the Great Auk, will have disappeared; surely this should not be permitted."

29 John James Audubon, 1843

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KANSAS FISH AND GAME

"One impulse from a vernal wood
May teach you more of man,
Of moral evil and of good,
Than all the sages can.

Enough of Science and of Art;
Close up those barren leaves;
Come forth, and bring with you a heart
That watches and receives.
William Wordsworth: "The Tables Turned," 1798

"IT is the story of all life that is holy and is good to tell, and of us two-legged sharing in it with the four-leggeds and the wings of the air and all green things; for these are children of one mother and their father is one Spirit."

John Neihardt, *Black Elk Speaks*

"Any nation is rich so long as its supply of resources is greater than the needs of its people. After that, no nation is self-supporting. Somewhere between these two extremes lies America and its problem of a world free from want."

Jay N. "Ding" Darling

"We now have these forest reservations, refuges where the timber and its wild denizens should be safe from destruction. What are we going to do with them? . . . If it is worth while to establish these reservations, it is worth while to protect them."

Theodore Roosevelt & George Bird Grinnel, 1893

"Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts. There is symbolic as well as actual beauty in the migration of the birds, the ebb and flow of the tides, the folded bud ready for the spring. There is something infinitely healing in the repeated refrains of nature – the assurance that dawn comes after night, and spring after the winter."

Rachel Carson, *A Sense of Wonder*

"As man proceeds toward his announced good of the conquest of nature, he has written a depressing record of destruction, directed not only against the earth he inhabits but against the life that shares it with him."

Rachel Carson, *Silent Spring*

"Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself . . .

Chief Seattle

Write your own quote.

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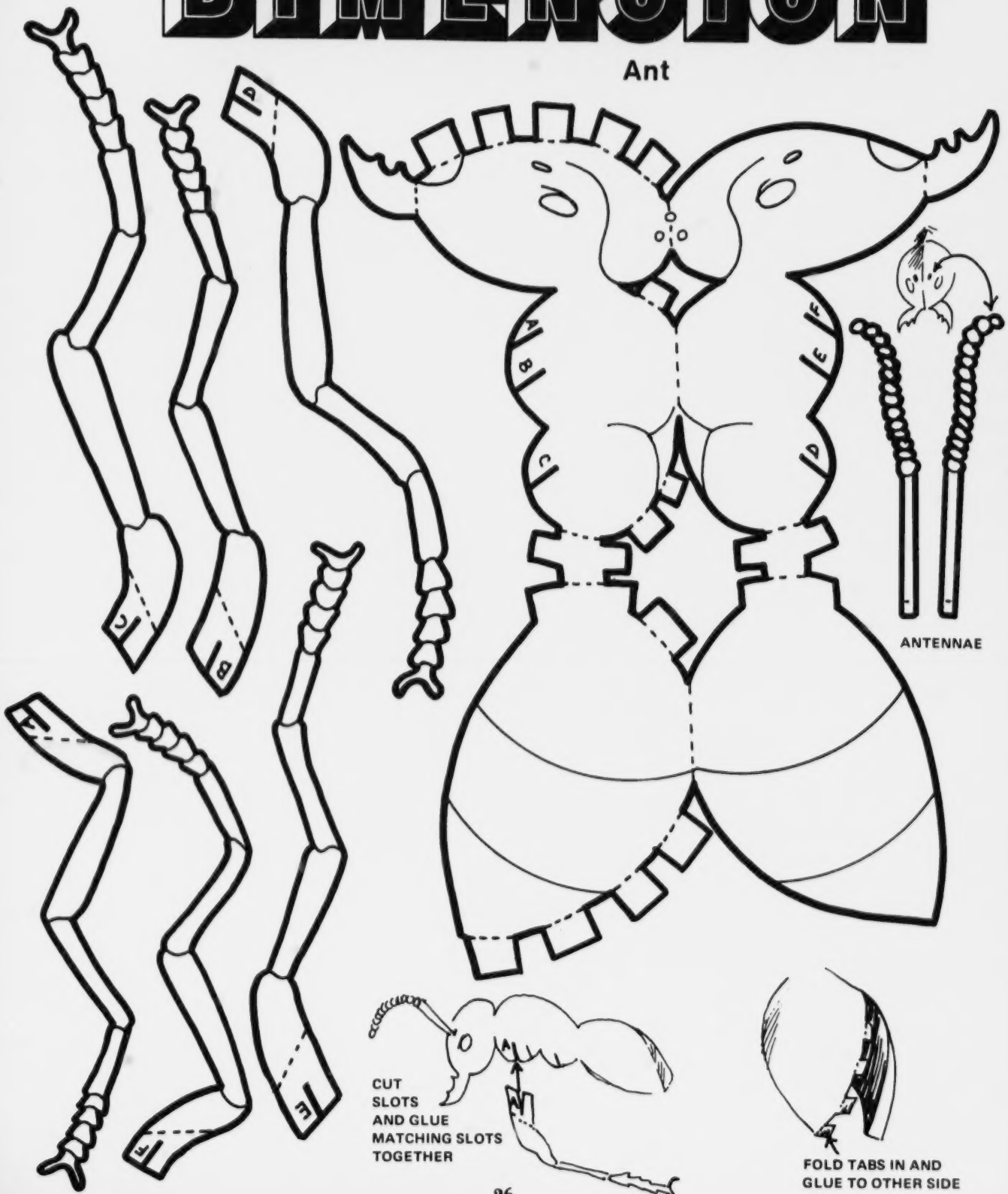
KANSAS FISH AND GAME

WILDLIFE IN ANOTHER DIMENSION

Ant



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ENDANGERED, OR ALIVE AND WELL

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KANSAS FISH AND GAME

WILDLIFE IN ANOTHER DIMENSION

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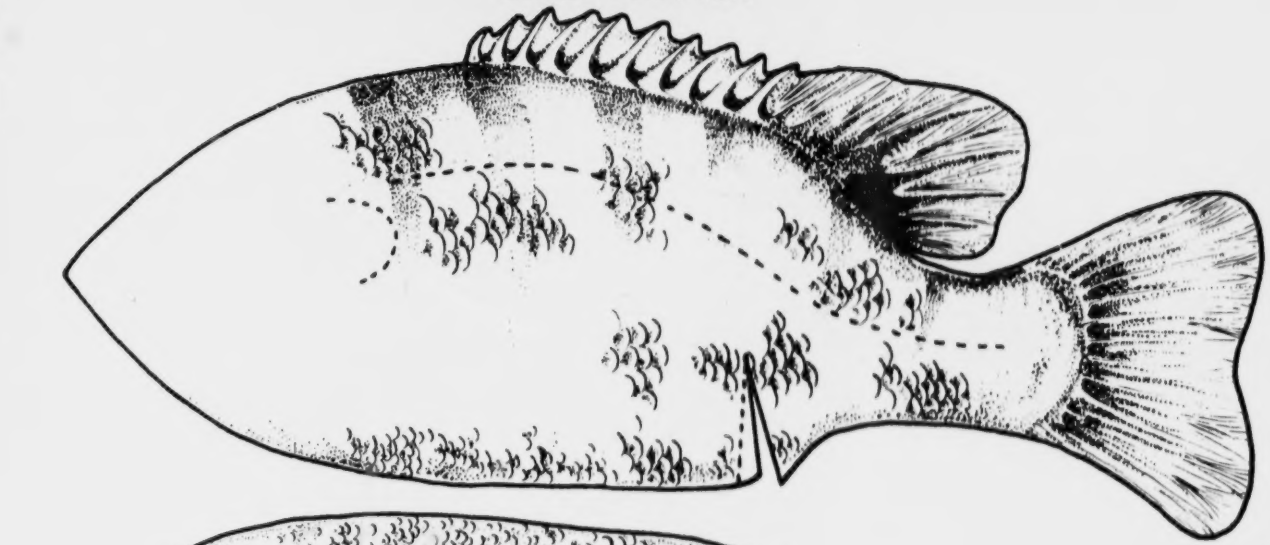
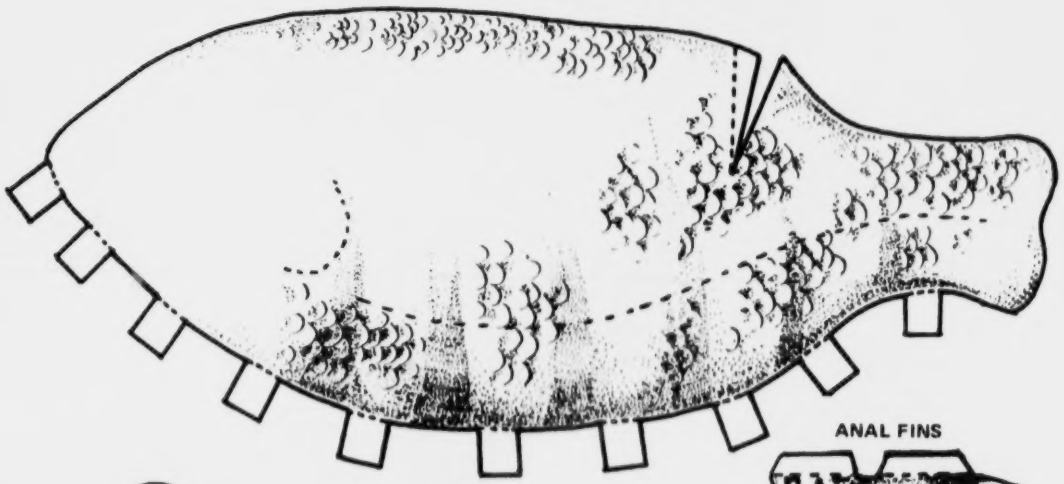
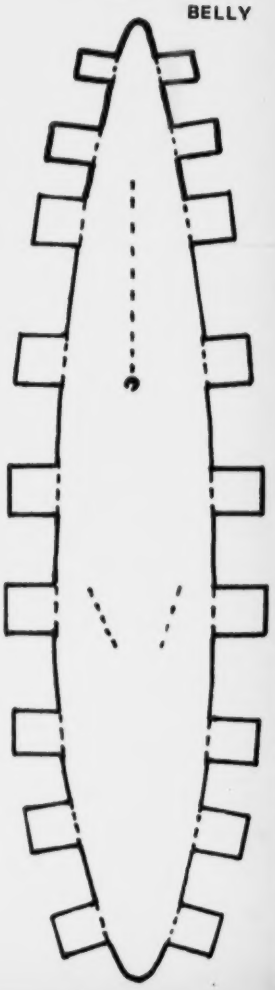
Green Sunfish

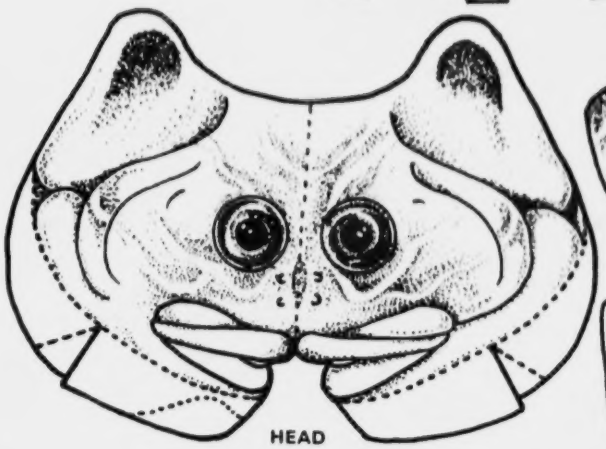




BELLY

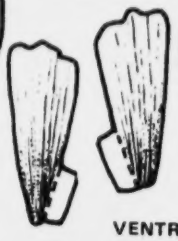


ANAL FINS



HEAD

PECTORAL FINS



VENTRAL FINS

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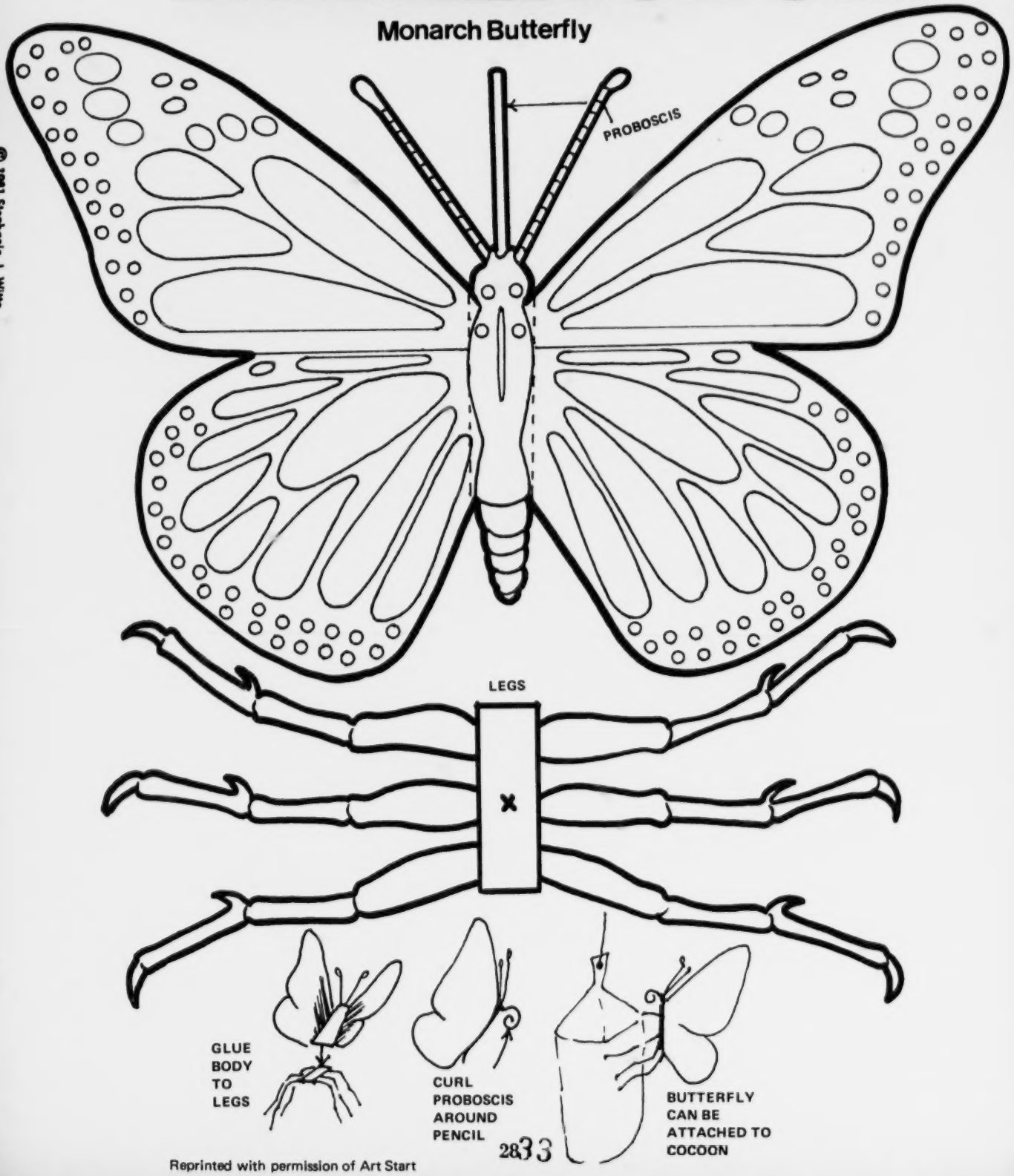
WILDLIFE IN ANOTHER DIMENSION

Monarch Butterfly



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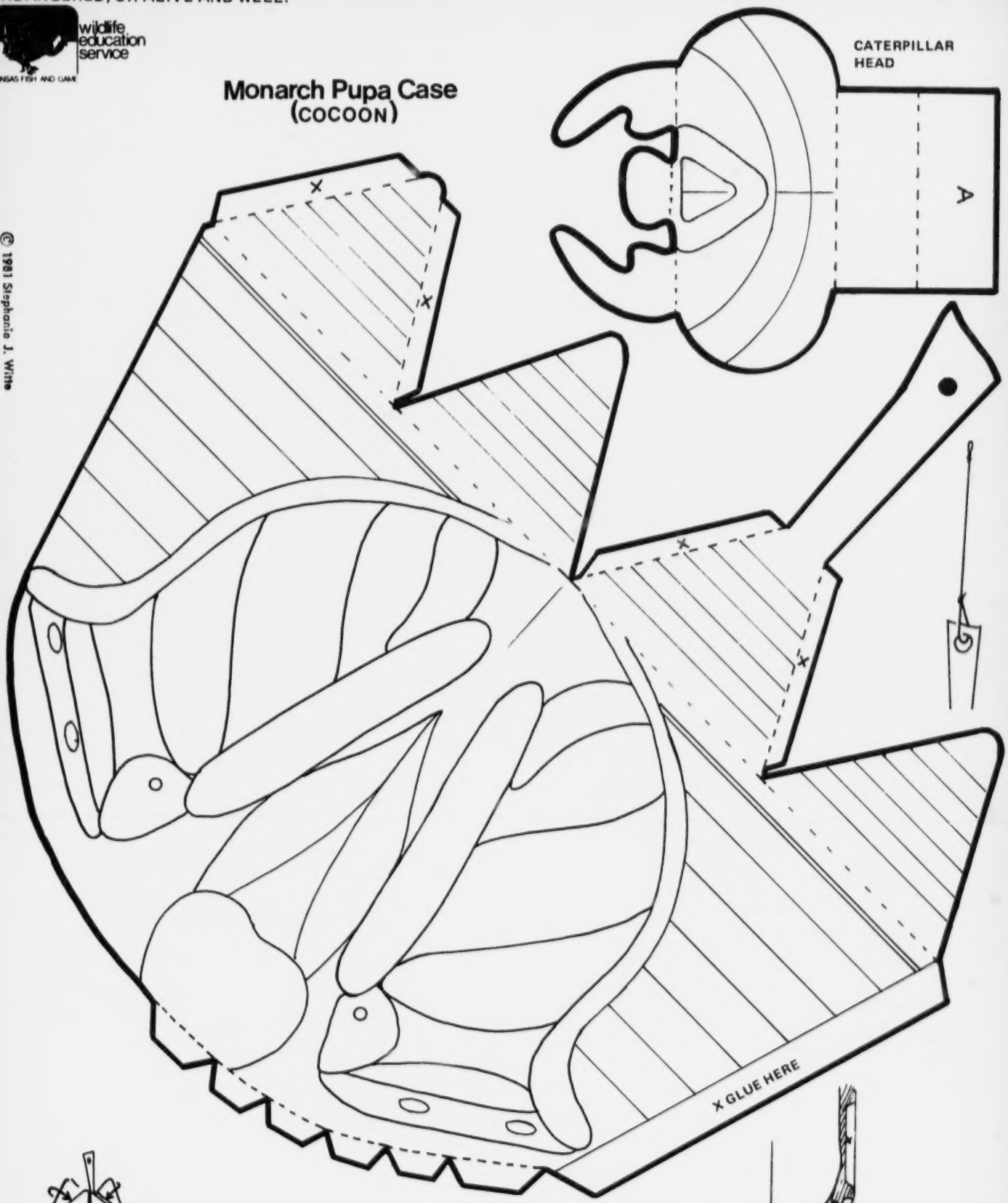
KANSAS FISH AND GAME

Monarch Pupa Case
(COCOON)



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GLUE WHERE MARKED X

TURN TABS INSIDE TO GLUE BOTTOM

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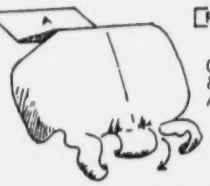
ARKANSAS FISH AND GAME

Monarch Caterpillar

BODY

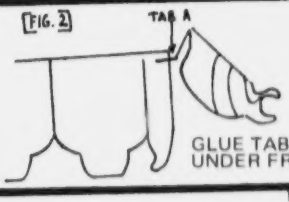
GLUE TABS UNDER CATERPILLAR

[FIG. 1]



CURL MOUTH, PINCHERS & SIDE OF HEAD AROUND A PENCIL

[FIG. 2]

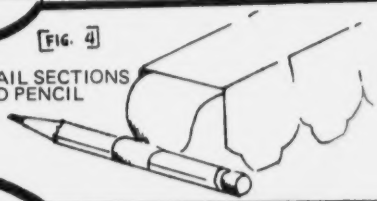


GLUE TAB A UNDER FRONT SECTION

[FIG. 3]

GLUE 1 ANTENNA ON EACH X

[FIG. 4]



CURL TAIL SECTIONS AROUND PENCIL

ANTENNAE

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KANSAS FISH AND GAME

ENDANGERED— A Word To The Wise

When people talk about endangered wildlife, new vocabulary appears. We are familiar with some of the words but maybe not all of them. Fill in the blanks below with the correct word from the list. Use each word only once.

1. _____ is where an animal lives; where it finds food, shelter, water, etc.
2. _____ helps keep healthy populations of game animals at manageable levels.
3. Animals that were once found in Kansas, but are now only found in other places outside the state are called _____.
4. Instead of increasing in number or remaining steady, some endangered animals continue to _____.
5. Plants and animals are _____; which means they need each other.
6. Some _____ are natural, others are made by people. They may result in plants and animals becoming endangered.
7. A _____ species may continue to fall in number and be placed on the endangered species list.
8. _____ means there are no more of this species.
9. With _____ and _____, wildlife has a future. These are done by biologists who care about wildlife and habitat.
10. When we misuse _____, we _____ our _____.
11. National wildlife _____ are homes for many _____, or kinds of animals.
12. When an animal or plant is put on the _____ species list, it means there is still time for it to _____ if we care.
13. _____ is the study of living things and how they relate to their environment.
14. Some species can _____ to change better than others when we _____, or make changes to the environment.
15. Biologists have tried to _____, or bring species like antelope, elk, turkey, sharp-tailed grouse and swallow-tailed kites back to Kansas where they once lived. They hope the animals will _____ and raise their young here so Kansas will have a healthy population.

extinct
endangered
species
decrease
ecology
reestablish
threatened
habitat
interrelated
pesticides
hunting
adapt
extirpated
changes
disturb
reproduce
management
environment
survive
pollute
refuges
research

36

Key. 1. Habitat; 2. Hunting; 3. Extirpated; 4. Decrease; 5. Interrelated; 6. Change; 7. Threatened; 8. Extinct; 9. Management, Research; 10. Pesticides, Pollute, Environment; 11. Refuges, Species; 12. Endangered, Survive; 13. Ecology; 14. Adapt, Disturb; 15. Reestablish, Reproduce.

NAME

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Supplementary Activities and Approaches

Listed below are approaches for using the student booklet and worksheets. Additional activities have been included for those teachers who are interested in furthering their study of wildlife. These activities can be done in a variety of curricula areas and are listed by subject. Basic skills will be practiced while students learn more about wildlife. Many of these ideas may already be familiar; others are new. A few of the activities were adapted from *Multidisciplinary Wildlife Teaching Activities*, by William Hernbrode, and *Sharing Nature With Children*, by Joseph Cornell. Check the Wildlife Reference Center for further activity sources. There are several excellent activity guides listed under Miscellaneous Books.

Language Arts

—The story script may be taped so that students may listen while they read.

—After reading the story, have your students make up their own stories or poems about the animals they have seen in the booklet. Students can act out their stories or draw pictures to express their ideas. Have the children think about what it would be like to live in a world without wildlife.

—The words in the script, and especially those listed on the vocabulary page, can be used on a spelling list. If you have an existing list, these could be added as bonus words. Or try scrambling the order of the letters of each word or putting the words into a word search.

—Use the booklet as a supplementary reading text to study compound words, blends, vowels, syllabication, affixes, parts of speech, etc.

—For more handwriting practice, have students write descriptive sentences about each of the endangered species in Kansas. They can refer back to their booklet or worksheets for information about each species.

—If you read daily to your class, why not include stories or poems about animals and the environment, especially those related to Kansas? Recommend your favorite selections to the school or public library for their future purchases. Refer students to books about wildlife when they need help in making a selection.

—Write plays or skits about wildlife. Research the animals so that the roles played and the habitat settings are accurate.

—Exchange letters with pen pals from a class in another state or region of Kansas. Choose an area that has habitat different from your area. Student's letters should include descriptions of wildlife and habitats near their homes. What are the similarities and differences? Photographs, illustrations, or samples of appropriate items may enhance the exchange.

—See how many different words your students can come up with using letters from the words: Threatened and Endangered Species. Letters can be taken from any of the four words. Proper nouns are not allowed. Dictionaries can be used as references.

—Epitaphs and obituaries are written for humans and some special pets. How would an epitaph or obituary read if it was written for extinct or extirpated wildlife species? Have students compare the kind of information included for human epitaphs and obituaries when they prepare to write one for a wildlife species.

—Produce a radio or television commercial on threatened and endangered wildlife. Children may work in teams to organize the specific topic and their approach. Have each group present their commercial to the rest of the class.

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KANSAS FISH AND GAME

—As a class or individual project, write an article for your local or school newspaper about endangered species in Kansas. Include the reasons for endangerment, and stress what needs to be done. Double check your sources of information with reliable references such as U.S. Fish and Wildlife Service literature.

—Have the students survey the schoolyard and group what they see as either "changing" or "unchanging". Explain why the changing items are experiencing this change. Emphasize that the environment is always undergoing change. Succession is the change in animal and plant species composition that occurs over time. What signs of succession can you see in or around the schoolyard? Estimate the age of each successional zone.

—Practice basic reading skills using the following article and questions. Develop other questions to practice the skills you are currently teaching.

ENDANGERED SPECIES

Since life began eons ago, thousands of creatures have come and gone like the dinosaur—sometimes rendered extinct by naturally changing ecological conditions but more recently by humans and their activities.

If extinction is part of the natural order, some people ask: "Why save endangered species? What makes a relatively few animals and plants so special that effort and money should be expended to preserve them?"

Congress addressed these questions in the preamble to the Endangered Species Act of 1973, holding that endangered and threatened species of fish, wildlife, and plants "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." In making this statement, Congress was summarizing a number of convincing arguments advanced by thoughtful scientists, conservationists, and others who are greatly concerned by the disappearance of wildlife.

Sadly, we can no longer attribute the increasing decline in our wild animals and plants to "natural" processes. Most are declining because of exploitation, habitat alteration or destruction, pollution, or the introduction of new species of plants and animals to an area. Protecting endangered species and restoring them to the point where their existence is no longer jeopardized is the primary objective of the U.S. Fish and Wildlife Service's Endangered Species Program.

(Paragraph taken from "Endangered Species" —U.S. Fish and Wildlife Service)

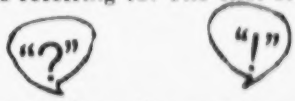
Word Attack Skills — Use context clues to define the following words: eons, attribute, jeopardized, extinct, esthetic, expended, preamble, exploitation and existence. Underline all the words that contain blends. Circle all the affixes. List any compound words.
Comprehensive Skills — What is the main objective of the U.S. Fish and Wildlife Service's Endangered Species Program? Of what value are threatened and endangered species? Name one extinct animal. What are some of the reasons that wild animals are declining in number?

—Invite a representative from a conservation group to speak to your class. Local Audubon, Izaak Walton League, Sierra Club, etc., members may be available to make a short presentation to the class and be interviewed by the students. Students should be prepared before the speaker arrives, and spontaneous questions should be allowed after the interviews are complete.

—Have students write a paragraph describing a particular threatened or endangered species without naming the animal. Have students exchange papers with others trying to identify the animal.

—Scientists have studied animal communication and observed some very interesting means of wildlife "conversing" with each other. Dolphins, birds, apes, etc., have all been recorded and studied. If we could communicate with animals, what would we say? How would they respond? Have each child write the discussion as they "hear" it.

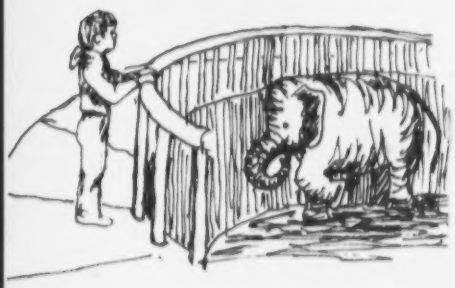
—Play a modified version of charades. Have children take turns being the "describer." This person makes descriptive statements about the animals they have in mind. The rest of the class tries to guess what animal the describer is referring to. The first student to guess the correct answer becomes the next describer.



—Have students list what they think are the most important issues facing wildlife and the environment. Brainstorm solutions and necessary actions. Children should bring in magazine or newspaper clippings that relate to the list of topics. What legislation affects these problems? What can you do in your area to help?

wildlife education service
KANSAS FISH AND GAME

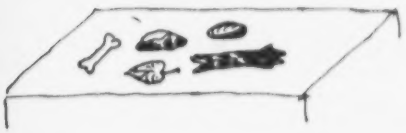
Science



—Take a trip to a nearby zoo to observe not only the animals, but the zoo operation. Have students interview the zoo keepers or attendants. What kinds of problems do they face; what successes? How many of the zoo animals are native to Kansas? How many animal births has the zoo experienced? Which species have the most success in producing young while in captivity? Zoos can be excellent sources of research information along with an opportunity to see species that you might never be able to otherwise. Locate the zoos in your area and in the state. Two of significance are the Wichita and Topeka zoos. After the visit, design a zoo that the students feel best meets the needs of animals and people. What factors need to be considered when working with large, nocturnal or endangered animals?

—Take advantage of your schoolground and surrounding area. You don't have to travel far to study the environment. Weekly hikes around the schoolyard can be very enlightening, especially if you select a topic or theme that will hold students' attention. Topics might include: animal homes, animal tracks and traces, animal sounds, birds, mammals, insects and other invertebrates, life on tree bark or other plants, cold-blooded wildlife (fish, reptiles, amphibians), spiders and their kin, predator-prey relationships, and life under a board or rock. Let the children come up with an occasional theme.

—Build a class terrarium so that children can observe animals such as snails, earthworms, beetles, etc. Children can observe the interaction of animals with plants. How are plants and animals alike, and how do they differ?



—Have a "touch and see" table in your classroom with tree bark, rocks, bones, shells, etc. that your students can explore in their free time. Add items that the children bring in. If you don't have room for a table, have a "touch and feel" box of appropriate size. Cut an opening for hand and arm, and place objects inside that students may identify by touch only.

—Review animals in the booklet by fastening a picture of an animal on the back of one child. The other children can see the picture, but this child cannot. To discover his or her identity, the child must ask yes or no questions to the other members of the class.

—Predators have often been given a bad name as being killers of innocent animals. However, in general, predator species in comparison to prey species have declined in number. Have students go through the list of endangered species in Kansas and label those that are predators. Why are these species endangered? Discuss with the class that if an animal's food source is gone, it must either adapt to eating something else, move elsewhere, or decline in number.

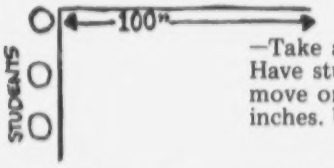
Some predators, such as the wolf and coyote, have been labeled pests by farmers and ranchers. Coyotes have adapted to humans where wolves have not been as flexible. How do the two species vary as far as population stability? What is the status of each species? What other predators (grizzly bear, mountain lion) have been greatly reduced in number because of their perceived negative impact on human activity? What fables or fairy tales can you remember about predators? How were these animals depicted in the stories? Stress with your students that placing a judgement of "good" or "bad" on animals can be dangerous. Predators fulfill an important and natural role. Their part in the food web cannot be eliminated without problems resulting. Discuss the impact of not having predators (i.e., over-population, disease, starvation of prey species).

—On one of the worksheets, students are given the opportunity to design an "unendangered species", one that is resilient and fairly flexible to change. Now have them design a species that is likely to become extinct. Compare the two species and see what characteristics they demonstrate. Are there real animals that can be appropriately placed in either group? Have the children make predictions as to the species they think may be threatened or endangered in the future.

—Mark off a 40-to 50-foot trail, and place 10 to 15 man-made objects along it. The children walk silently along the trail, trying to spot (but not pick up) as many of the objects as they can. When they reach the end of the trail, they whisper the number of objects they saw to you. If they missed any, see if they can find them on a second try. End with a discussion of camouflage, and natural and man-made things. What examples of camouflage did they find?

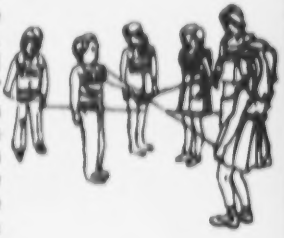
wildlife education service
KANSAS FISH AND GAME

—Develop a habitat plot on your schoolgrounds. Prairie grasses and flowers can be obtained by gathering the seed heads at maturity. Trees, shrubs and other plants can be obtained from a local nursery; or they can be transplanted from another area in the fall or early spring. Use seed heads acquired from local farmers or seed stores to plant a food plot of sunflowers, milo, and millet for wildlife. Check with your local extension agent, soil conservationist, wildlife biologist or other conservation professionals for information and/or assistance. This ongoing project combines several disciplines in its scope and allows students pride in a project they can enjoy for years. One word of advice: Let your groundskeepers know of your plans, and fence off the area in some way to keep mowers from destroying your hard work. A sign explaining the project will let others in on what you're doing and could trigger further projects. How has your project changed the environmental quality of the area? Take an inventory of the wildlife in your study area. Do certain types of plants attract particular species? Develop a land use plan for your schoolgrounds and share it with the principal.



—Take a 100-inch hike by measuring off an area approximately 100 inches long. Have students spread out along a line that is perpendicular to the first line. They move on hands and knees to count all the small animals that they find in the 100-inches. Use magnifying lenses, if available. Compare and discuss within the group.

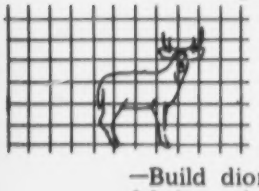
—Play the food web game. Each participant wears the name of a plant, animal, or element (air, sun, water, or soil). The name tags can be decorated with a picture of the plant, animal, or element. The name tags are made from 5 x 7 cards and can be easily worn if a piece of yarn is attached to the corners of the card so that it will hang around the neck. Use animals and plants found in your area; some suggestions are: fish, cricket, snake, mosquito, owl, bluejay, turtle, bobcat, mushroom, trees, poison ivy, dandelion, etc. Have the group form a circle, standing close enough together so they can read the other name tags. The person labeled "SUN" begins the game. He or she hangs onto the end of the yarn and passes the ball of yarn to any other player who has a direct need for the sun. The player who receives the ball of yarn looks for a player he or she needs in order to survive, or a player who depends on him or her for survival. He or she holds onto the strand of yarn and passes the ball to that next player. As the game progresses, discuss the relationships between the members of the web. Try to get all the players involved, and discuss why the elements and lower level organisms seem to have more yarn in their hands (therefore needing to have more organisms at that level than at the upper level.) Before enthusiasm wanes, discuss what impact people have on the food web. How does draining a marsh or pond, fire, disease, and restoring habitats affect the food web. Of course, we have some positive and negative impacts. The group might consider what they can do to keep the food web in a healthy state.



Art

—Wild animals display not only a variety of colors and shapes, but also different patterns. Notice the interesting patterns in butterflies, fish scales, spider webs, feathers, etc. Combine these designs in a drawing or a painting.

—Make a set of posters of the threatened and endangered species in Kansas. Students can work in groups producing one poster per species or one per class (ie, birds, mammals, etc.). On the front or back of the poster, students should include important information about each species such as reasons for endangerment, range map and short biography.



—Allow children an opportunity to draw animals at a different scale. Trace the outline of one of the animals in the booklet onto grid paper. Give each child a copy of this illustration, and provide them with a sheet of grid paper of a larger or smaller scale. Their job is to reproduce the illustration at the different scale. Have them figure how many times larger or smaller their drawing is than the original.

—Build dioramas of animals in their habitat. Use modeling clay, shoe box, plant parts, fabrics, paint, etc.

—Take photographs of wildlife in a variety of situations. If possible, develop your own black and white photographs. Explain the process of developing negative and positive images.

wildlife education service

—Puppet plays allow students to creatively express their knowledge of a subject or several concepts. Have the children create puppets and put on plays for other students. The play topics might include: how wildlife would deal with a particular problem facing them, succession, animals finding a place to live, predator-prey relationships, food chains, etc. Appropriate background music can be played to add to the presentation.

—Build an animal home, such as a bird nest, by using materials students can gather on the school ground or in the classroom. Each student or group can build an animal home for their favorite animal or an imaginary one. Discuss what the animal's needs are. Compare the home with one built by an animal. How is the animal adapted for building its home?

—Design wildlife bookmarks, book jackets or bumper stickers of threatened and endangered species. Cover the surface with clear contact paper for durability.

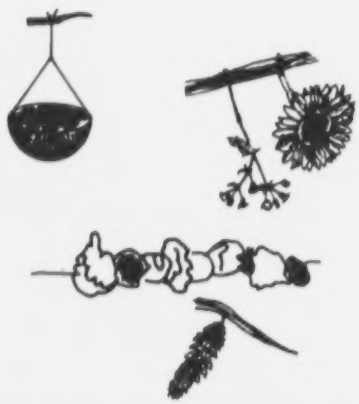
—The worksheets include three-dimensional models. Run off copies of these pages on construction paper to add support to the model. See if you or your students can design other animals by using these as patterns. You may want help from volunteers when children are working on these projects.

—Make wildlife sculptures from tumbleweeds, sand, or snow. Paint the finished sculpture with dilute tempera in a spray bottle or with spray paint. Details can be added with a paintbrush or additional materials, such as fabrics.

—Make plaster casts of animal tracks. Begin by locating mammal or bird tracks. Make a collar from construction paper to surround the track so that the plaster is held in place. Combine plaster with water until a pancake batter consistency is reached. Place the collar around the track. Pour the plaster into the collar and wait 15 to 25 minutes for it to dry. A paper clip can be inserted in the plaster cast before it's completely dry, so that the finished cast can be hung on a wall. Identify the track with field guides. What can you tell about an animal from its track? A less messy alternative to plaster casts is recording tracks on smoked paper. Smoked paper can be made by holding paper over a burning candle, allowing carbon from the smoke to collect on the paper. Anything that touches the surface will leave a mark. Place the sheets in areas where animals are known to travel, or use bait to draw animals to the paper.

Industrial Arts

You can attract wildlife to your home and school yard if you provide habitat. Here are some easy-to-construct feeders that will bring enjoyment during the winter.



—Make bird feeders from dried grapefruit rinds or coconut shell halves. Hang them from a branch with string. Fill with seed.

—Hang sunflower heads or thistles from branches. Set aside a plot at home or in the schoolyard to grow them.

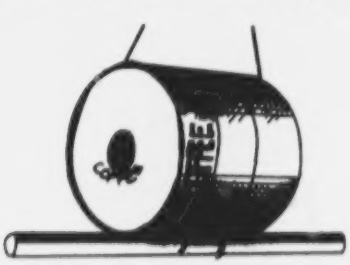
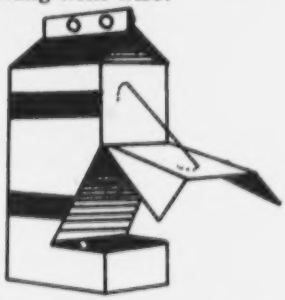
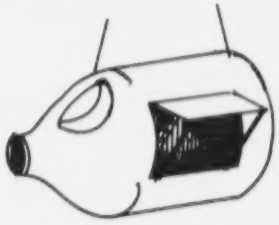
—String popcorn, peanuts and cranberries and drape around a tree.

—Press peanut butter into a pine cone and roll the cone in a mixture of bird seed. Hang with string from a tree branch.

—Make a feeder for small birds with a coffee can, wire, and a dowel or branch. Cut out the bottom of the can. Carefully cut a two-inch hole in the center of two plastic lids. Put the lids on the can. Hang the feeder horizontally by running wire through small holes in the lids and through the can. Attach a stick or dowel as a perch. Fill the lower half of the can with seeds, cereal, bread crusts, etc.

—Use a half-gallon milk carton for a feeder. Cut out an opening for feed about one and one fourth-inches deep. Hold up the roof with a straightened paper clip inserted in the side of the carton and the roof. Bend the clip to hold the roof in place. Reseal the carton with a stapler and hang with a wire, or set feeder on a windowsill. Small holes can be made in the bottom of the feeder to let rainwater out.

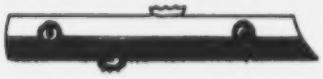
--Recycle detergent and bleach bottles to make feeders. Thoroughly clean the containers. Hang the detergent bottles vertically after cutting two circles the size of a 50-cent piece in their middles on each side. Slide a perch through nail holes below the opening. To make a horizontal feeder from a bleach bottle, cut 6-inch long and 4-inch wide flaps in the side of the bottle. Prop these open with a twig. Attach a dowel or twig perch and hang with wire.

—Suet feeders are easy to make from an old onion bag or nylon net. Open the bag and fill it with suet (animal fat) from the grocery or meat market. Tie the bag shut and hang it from a tree branch.

—Build a log feeder from a dead branch about 15 inches long and 3 inches thick. Nail bottle caps onto it. Attach an eye bolt into the top of the log to hang the feeder vertically. Fill the caps with a peanut butter and bird seed mixture. An alternate method is to drill holes in the log and fill them with a mixture of bird seed, peanut butter, and ground suet.

—Two aluminum pie pans can be combined with one eight-to ten-inch dowel and two jar lids to make a feeder. Place a metal jar lid in the center of a large aluminum pan, and another inside a smaller pan. These lids will add weight and support to the feeder. Nail one end of the dowel to the small pan and lid arrangement. Attach the top of the feeder (large pan and lid) to the other end of the dowel with a nail or eye bolt. Hang the feeder from a tree limb or from the eave of your house.



It is very important to continue feeding the birds once you begin in the winter. Birds will learn to depend on you for food until they find other sources of food in the spring. If you stop feeding during the cold weather, the birds may suffer.

—Keep a record of the birds you see and their behavior. What are the different birds' favorite foods? Have the class bring in leftover bread crusts, oatmeal, corn, unsugared cereals, etc. to fill the feeders. Most meat markets will give suet away or sell it inexpensively. Ground suet is a good addition to the seed mixtures. The fat will help the birds withstand the winter cold.

Mathematics

-Estimates of populations can be figured using a technique called the Lincoln-Petersen Index that will allow students to work with ratios. This technique can be practiced using beans or some type of playing chip, and later expanded to real wildlife populations. Mark off a one or two square meter plot for each small group of students. Deposit an unknown quantity of beans in the plot. Give the students 30 seconds to "capture" all the beans they can find. Count the beans and mark those beans with a magic marker. Throw the "captured" beans back in the plot. Once again, allow the students to capture individuals and count the captured. How many of these individuals were marked from the first capture? Figure the Lincoln-Petersen Index using one of the following formulas:

$$\frac{\text{Population Estimate}}{\text{Total Number of Individuals Captured the First Time}} = \frac{\text{Total Number of Individuals Captured the Second Time}}{\text{Number of Marked Recaptured Individuals}}$$

wildlife education service

or

$$\text{Population} = \frac{\text{(Number caught first time) x (Number caught second time)}}{\text{Number of Marked Recaptured Individuals}}$$

What problems might arise when biologists use this technique?

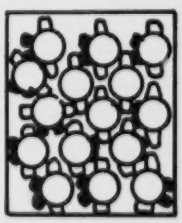
—Many animals which were once abundant are now extinct or reduced in number. Other species have gained in number as seen in the worksheet "The Buck Stops Here." Read the following passages to your students, then pose the questions below.

Buffalo, or bison, were recorded to have darkened the horizon with their numbers. Pike traveled in 1806 near Garden City, Kansas and recorded this observation in his diary: ". . . the face of the prairie was covered with them, (animals) on each side of the river; their numbers exceeded imagination." Second Lieutenant George S. Anderson took his command at Fort Hays, Kansas, in September 1871. A few weeks later, he was transferred to Fort Lyons, Colorado, on the Arkansas River. On the trail, October 13, 1871, the troops passed buffalo. They could see "hundreds of thousands" of buffalo on the prairie. While along the Smoky Hill River, Anderson and his men encountered more buffalo. "For six days we continued our way through this enormous herd, during the last three days of which it was in constant motion across our path . . . it is impossible to approximate the numbers that composed it (the herd)." Passenger pigeons were once so thick that their numbers seemed limitless. In 1673, writer John Josselyn noted "I have seen a flight of Pidgeons in the spring at Michaelmas, when they return back to the Southward, for four or five miles to my thinking had neither beginning nor ending, length or breadth, and so thick I could see no Sun." The term "millions of millions" was used to describe passenger pigeons seen by Josselyn in Massachusetts. Jacques Cartier, an early explorer who ventured along the St. Lawrence River in 1545, noted: " . . . a great store of Stags, Deere, Beares, and other like sorts of beasts as Connies (rabbits), Hares, Materns, Foxes, Otters, Bevers, Weasels, Badgers, and Rats (muskrats) and exceedingly great and divers other sorts of wild Beasts." *(sic)*

How many of these species would you estimate once lived in the United States? What number (approximately) live in Kansas today? An estimated 60,000,000 bison lived in the U.S. in the early 19th century. What other historical and current information can your students discover about wildlife in Kansas and the United States? Population size can be estimated for species common to your area. Have students determine an efficient method and attempt to carry out the census. Refer them to the Lincoln-Petersen Index shown in this section.

—Size can be an abstract concept unless it is visually displayed. Students can grasp the size of many units of measurement, such as an acre or the size of animals, if they are marked off on the school grounds. For animal measurements, use a field guide or other resources to get accurate height, length, and weight measurements. How tall is an antelope? How long is an average adult rattlesnake?

—Demonstrate the effects of crowding with the following activity: Place an old blanket, sheet or tarp outside or on the floor. Measure the area. Ask the entire class to stand somewhere on the blanket. The children get off and you fold the blanket in half. Measure the new area, and have the children get back on the blanket. They may have to work at getting in the space. Have them get off, and once again, fold the blanket in half. Measure the new area. Have the students attempt to fit. They should use their imaginations to get most of the children on. Continue the procedure until only one person fits. Have the children compare this situation with that of wildlife and habitat loss. Wildlife and people need space.



—An annual eagle survey is held nationwide with the survey taking place in Kansas during January. The results provide information about population trends and identify important wintering habitat. Results of the survey for the past five years are as follows:

	Bald Eagle Total	Golden Eagle Total	Unidentified Eagle Total
1983	436	37	7
1982	472	42	3
1981	308	140	5
1980	341	33	1
1979	188	38	1

Factors such as weather, ability of observers to correctly identify juvenile birds, number of observers, length of survey, and movement of eagles in feeding areas may affect the counts. Graph the survey data for the 5 years. Compare each year's results with winter weather data for that year.

wildlife education service

—Species diversity is one measure of the stability of a community. The greater the diversity, the more stable the community. Measure the species diversity on several sites of the schoolground by using the following formula.

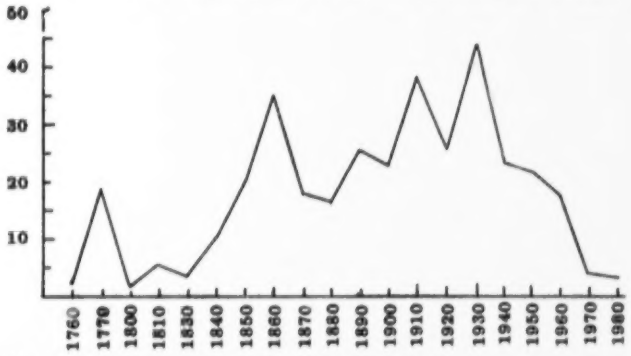
$$\text{Diversity} = \frac{\text{Total number of species}}{\sqrt{\text{Total number of individuals}}}$$

Have the students work in small groups, applying this formula to a square meter plot. What factors are involved in the differences in diversity throughout the schoolground? Where is the species diversity the highest? How does plant diversity affect animal diversity? How does this number vary throughout the seasons?

—Using the graph below (also found in the student booklet) have students answer the following or similar questions.

EXTINCTIONS IN THE UNITED STATES (including Hawaii)

(While the rate of extinction is dropping in the U.S., it is increasing in other parts of the world.)



1) What is the general trend of extinction? (increase, decrease, or stay the same)
2) What ten year span showed the greatest increase in extinct species?
3) List the years where 30 or more species became extinct.
4) Since 1760, what is the average number of extinctions per year in the United States?

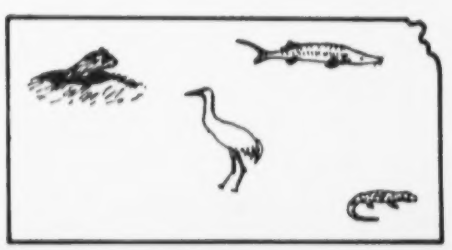
Social Studies

—Learn more about the seasons by keeping a record of changes throughout the year. Have the class pick a special spot on the schoolgrounds, or allow each child his or her own location for making observations. Observe the changes that take place through the year. How do shadows change with the time of day and season?

—Have your students list all the things they need to live. How does this list compare with a similar one for wildlife? Which items from the lists overlap? Can the children revise their list and do without some things? Stress food, water and cover as the essentials for wildlife and humans. Try to differentiate between what we need to survive and which items are for a "better" standard of living.

—Ask the children to observe and list habitat changes caused by humans. Discuss their lists, and ask how they think each of the changes has affected wildlife. If they had control over the past, how would they have acted differently? If they could control the future, how would they plan to manage for people and wildlife to share the world?

—Make a wildlife map with a large outline of the state, showing pictures of threatened and endangered animals found in Kansas (from the booklet or drawn by students). Have students place the animals where they are found in the state. What affects the distribution of wildlife? Discuss rainfall, temperatures, plant life, terrain, habitat types, etc. Compare Kansas with other states to discover that some species have healthy populations in Kansas, while being endangered elsewhere, and vice versa. This activity could lead to or enhance a study of the United States.



wildlife education service
KANSAS FISH AND GAME

—Our national bird, the bald eagle, is an endangered species. If Ben Franklin's recommendations had been followed, the wild turkey, a game bird, would be one of our national symbols. Divide the class into two teams to debate which of the two species is an appropriate national bird. Base the debates on factual information as well as opinions and feelings about the issue.

—Find examples of living things that depend on each other for their well-being or survival. Define and discuss the words mutualism, commensalism, parasitism, and symbiosis.

—Our forefathers are frequently blamed for the condition of the environment. They entered a land of what seemed like limitless plenty. We've managed to find and surpass many of the limits. Setting your students back in time to the pioneer era of Kansas, review what Kansans faced in those days and how they developed the state. Ask the children how they would go about settling this new territory. What impact would their actions have on the new environment? What are some of the pros and cons of development? How would you plan for land use for the future?

—Interview local senior citizens who grew up in your area, to get a perspective as to what the environment was like years ago. How have these changes affected wildlife and human populations? How have different types of habitat been affected?

—Wildlife is a renewable resource, as are many other components of the environment, such as trees. Certain numbers of wild animals and trees can be removed each year, because they will be replaced in the future. Humans tend to use resources without really thinking about the impact on the environment. Make a list of those things that you use daily, such as pencils, food, paper, etc. Trace the processing path to the original source of each item. Which ones are from renewable resources, and which are from nonrenewable resources? What ideas do you have to better conserve all of our resources? What is a good definition for "conservation"? Have each child write their own motto to live by, for environmental ethics. Our actions have an impact on the environment. We can determine to what extent the impact is positive or negative.

—There are numerous herbicides and insecticides available for use on a large scale in agriculture or on a smaller scale on your garden. A few of these chemicals such as DDT and endrin, have been found in high concentrations in birds and other wildlife. DDT and other chemicals are blamed for the reduction of several bird species due to weakened egg shells. What kinds of chemicals, if any, should we use? How much do we know about how these chemicals affect people or wildlife, how long they last in the environment, what alternatives there might be? How important is it to us to have insect and weed-free gardens and fields? There are useful and important reasons for chemicals. Have students list some of these. Stress the need for more information on the consequences of our actions.

—Make a map of habitat located on the schoolground or in a nearby park. Label areas that receive the most sunlight. Place pictures of animals that are found in each area on the map. Add illustrations of signs that animals are in the area, such as insect chewed leaves, an animal home, or signs of animals in or around the bark of trees, etc. The map should also include a legend, compass rose, title, scale, and other features which make it complete.

—Several of the laws that protect threatened and endangered animals are discussed in the student booklet. What local, state, or federal agencies enforce and administer these and other wildlife laws? Hold a mock court case dealing with an endangered species and a violator. What value does an endangered species have to the students and the future?

Through class or small group brainstorming sessions, see if your class can come up with some solutions to land use problems that directly affect wildlife and therefore people. Compromises may be enlightening to many adults. Let conservation groups, legislators, and industry know of your ideas. Invite representatives from many diverse groups in to discuss their side of the land use issue. This may result in a discussion of the basic economic principle of supply and demand. Will there be enough land, water, wildlife and other resources to meet the demands? The increasing demand and decreasing supply of water in western Kansas could provide a case study topic.

—People use natural resources at a fast rate. Recommend to your students that they recycle and conserve natural resources as much as possible. Organize a paper or aluminum recycling project for your school or district.

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Music

—Write new wildlife-related lyrics to old songs.

—Have the children listen to bird or other animal sounds, concentrating on threatened and endangered species. Then have them design an animal they think would make that sound. Later, identify the animal and compare the real animal with the imaginary.

—There are many songs dealing with the environment or specific animals, such as "The Ants Go Marching." Find some other songs that deal with wildlife, or put a poem to music. Contact the Missouri Department of Conservation, P.O. Box 180, Jefferson City, Missouri 65102, for their song book, Missouri Conservation Melodies. There is a charge for this valuable book and accompanying cassette tapes.

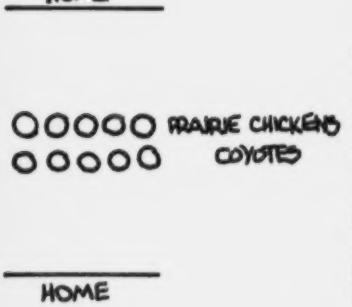
—Some birds, such as the mockingbird, can imitate other birds. How well can you "mock" bird songs? Put words to the beat of the bird songs and calls. Can you tell by listening to the sounds if the birds are using their voices to establish territories, attract a mate, or sound danger?

—Which animals would make good sopranos, altos, tenors, or basses? Listen to tapes, records or the animals themselves while on a walk.

—Some animals make specific calls, warning signals, or songs. Design instruments that sound like animals. Use wood, sandpaper, glue, construction paper, and odds and ends to create the sound.

Physical Education

—When students are running or playing on the playground, have them pick up litter. Their ticket to get back inside is at least four pieces of litter.

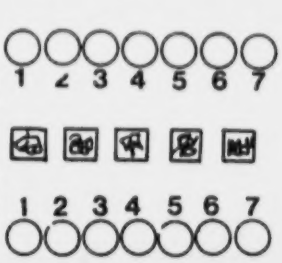


—Review what you've learned about wildlife and get some exercise by playing "Prairie Chickens and Coyotes." Divide the class into two equal teams. One group is The Prairie Chickens; the other is The Coyotes. The teams line up facing each other about 3 feet apart. Home territory is marked with a line 15 feet behind each team. The group leader or teacher makes a statement such as, "Wildlife needs water, food and cover to live." If the statement is true, the Coyotes chase the Prairie Chickens, trying to catch them before they reach their home territory. If the statement is false, the Prairie Chickens chase the Coyotes. Any players who get caught become members of the other team. Some questions might cause confusion. The leader should stay quiet until after the commotion has ended and then discuss the answer with the group.

—Divide the class into groups of approximately 5. Each group is given the name of an animal or chooses their own. The group combines to form the animal. The rest of the class tries to guess what animal the group is portraying.

—Each student is given the name of a threatened or endangered species. The same species can be given to more than one child. The children line up at one end of the playing area. One child is the chaser and calls out the name of a threatened or endangered species. When a player's name is called, he/she must run to the other end of the playing area, trying not to get caught by the chaser. If caught, the player becomes an additional chaser. When all names have been called, the chasers call the names of those who were not caught. Play continues until all players are caught.

—The class forms two teams, and each team counts off. The teams face each other from either side of the play area, with pictures animals mentioned in this unit on a center line. The instructor says the name of one of the animals, then calls a number. The two children with that number run to the correct picture, try to get it, and return to their place in line. The picture is replaced and play continues. The instructor keeps score. Add a challenge by having the player who does not reach the picture first attempt to tag the other player before he or she returns to home base. If the player is not tagged, the team gains two points; if tagged, one point.



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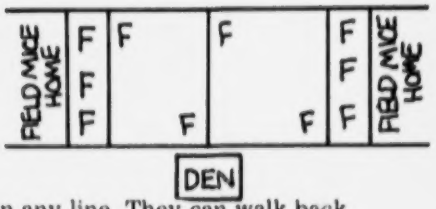
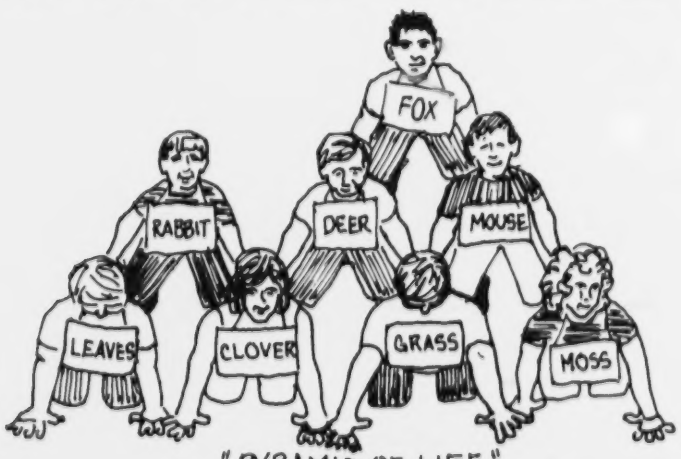


—Play "Fox and Field Mice". Ten children become foxes; others are field mice. They stand in the boundaries as shown in the diagram. Foxes may run from side to side but not out of their boundary line. The field mice line up at the starting line and try to make it to the finish line without being tagged by a fox. As many as four field mice may run at one time. Field mice are safe at home or while standing on any line. They can walk back and forth on the line, waiting to escape. If caught, the field mice sit in the den. Start a new game when several field mice have made it safely home, or when several are captured in the den. Have the field mice and foxes reverse roles.

—There are dances named after animals, such as the bunny hop and the fox trot. Try creating your own animal dances. Begin by demonstrating and practicing the bunny hop and fox trot. Give each group of 5 children an animal dance name, such as Buffalo Bump, Squirrel Swing Step, Rattlesnake Rumba, Porcupine Polka, Turkey Two-Step, Catfish Crawl, or Turtle Tango. Each group performs its dance in front of the class using the music of its choice. Stress that students use creativity in developing their dance.

—Take a "blind trust" walk. Students work with partners, each having a chance to be blindfolded. While "blind" they are carefully led to explore surrounding areas using their other senses. The leader may have the blindfolded person experience touching a feather or tree bark, smelling the soil, listening to the wind, etc. A group can be led together by having participants hang onto a rope throughout the course. Conclude the activity by seeing if the participants can retrace their steps when the blindfolds are removed.

—This activity should be done outdoors or in a large, open space. Have each child secretly write the name of a plant or animal that lives in the area. The players are going to build a pyramid; but don't tell them that until you've collected the papers. Get the class thinking about food pyramids by asking questions such as, "What form of life is the first to use the sun's energy?" (Answer: Plants.) The fun begins when you start to build the pyramid and the plants realize their fate. The plants will be on the bottom of the pyramid because all animals depend on them directly or indirectly for food. The plants kneel down on all fours, close together in a line. All the plant-eaters (herbivores) stand in a line behind the plants. All the meat-eaters (carnivores) stand in a line behind the herbivores. There will nearly always be more children in the upper level groups than in the supporting plant groups. (It seems much more fun to be a bobcat or coyote than it is to be a dandelion or muskrat.) With so many on top and so few for a base, it will be very difficult to build a stable pyramid. Some of the predators will have to change their position. Challenge the children to reconstruct a pyramid that will support all its members. The larger children can become plants, and any omnivores (animals that eat both plants and animals) can be herbivores. The higher up on the food chain, the fewer the number of animals there are. Demonstrate the importance of plants by threatening to pull one of them out of the pyramid.



"PYRAMID OF LIFE"

47

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Resources and References

etc... ...Appendix

Locate the Fish and Game Commission office closest to you. The office personnel may be of help, and most offices have free informational brochures.

Pratt Headquarters
Kansas Fish & Game Commission
RR 2, Box 54A
Pratt, Kansas 67124
316/672-5911

NC Regional Fish & Game Office
511 Cedar, Box 489
Concordia, Kansas 66901
913/243-3857

Downs District Office
Highway 24E
Downs, Kansas 67437
913/454-6315

Ellsworth District Office
North Main & West Douglas
Ellsworth, Kansas 67439
913/472-4290

Wakefield District Office
Wakefield, Kansas 67487
913/461-5402

NE Regional Fish & Game Office
3300 SW 29th
Topeka, Kansas 66614
913/273-6740

Blue Rapids District Office
801 S. Main
Blue Rapids, Kansas 66411
913/226-7509

Kansas City District Office
Clover Leaf Bldg. 1, Suite 221
6811 W. 63
Shawnee Mission, Kansas 66202-6024
913/722-6024

Lawrence District Office
512 E. 9th
Lawrence, Kansas 66044
913/842-5784

Manhattan District Office
Rt. 6
Manhattan, Kansas 66502
913/539-9479

Osage District Office
Osage State Fishing Lake
Box 303
Carbondale, Kansas 66414
913/665-7341

Valley Falls District Office
415 Broadway, Box 88
Valley Falls, Kansas 66088
913/945-3373

NW Regional Fish & Game Office
Route 2
Hays, Kansas 67601
913/628-8614

Colby District Office
190 Franklin, Box 366
Colby, Kansas 67701
913/462-3367

Stockton District Office
Division of Water Resources Building
425 Main
Stockton, Kansas 67669
913/425-6212

SC Regional Fish & Game Office
204 W. 6th, Box 764
Newton, Kansas 67114
316/283-2482
(Office will move to Valley Center on east K-164 after July 1985)

El Dorado District Office
2435 W. Central
El Dorado, Kansas 67042
316/321-6750

Emporia Wildlife Investigation Office
832 E. 6th
Emporia, Kansas 66801
316/342-0658
(Office will move to ESU campus after 6/85.)

Eureka District Office
300 W. Second
Eureka, Kansas 67045
316/583-6092

Wichita Urban-Metro Office
27th and Arkansas, Box 4034
Wichita, Kansas 67204
316/832-9787

Winfield District Office
Room 418, Winfield State Bank Building
Winfield, Kansas 67156
316/221-7110

SE Regional Fish & Game Office
222 W. Main Building, Suite C & D
Chanute, Kansas 66720
316/431-0380

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Independence District Office
805 Crescent Drive
Independence, Kansas 67301
316/331-6820

Mound City District Office
Box 331
Mound City, Kansas 66056
913/795-2218

New Strawn District Office
Box 103
New Strawn, Kansas 66839
316/364-2282

Pittsburg District Office
Route 2, Box 372 AAA
Pittsburg, Kansas 66762
316/231-3173

SW Regional Fish & Game Office
808 Highway 56
Dodge City, Kansas 67801
316/227-8609

Cheyenne Bottoms Waterfowl Mgmt. Area
Route 3
Great Bend, Kansas 67530
316/793-7730

Garden City District Office
South Star Route
Garden City, Kansas 67846
316/276-8886

KANSAS WILDLIFE Magazine
A bi-monthly publication
available from the
Pratt headquarters.
$6.00 - 1-year subscription
$11.00 - 2-year subscription
$15.00 - 3-year subscription
(Prices subject to change.)

There are several other excellent sources of information on environmental topics available in Kansas and nationally. The organizations provide materials, speakers, or services on environmental education. This list is not complete. Make additions where appropriate.

Kansas Organizations

American Camping Association
Missouri Valley Section
4201 W. 15th Street
Topeka, Kansas 66604

Dillon Outdoor Education Center
3002 East 30th
Hutchinson, Kansas 67501

Environmental Education Curriculum Materials Center
Education Division
Farrell Library, Kansas State University
Manhattan, Kansas 66502

Great Bend Zoo
City Park
Great Bend, Kansas 67530

Kansas Academy of Science
Department of Biology
Emporia State University
Emporia, Kansas 66802

Kansas Advisory Council for Environmental Education
(Contact the State Department of Education
Science coordinator, or State and Extension
Forestry for information.)

Kansas Association of Conservation Districts
Route 1, Box 32
McPherson, Kansas 67460

Kansas Bass Chapter Federation
(Write to Kansas Fish & Game Commission
RR 2, Box 54A, Pratt, Kansas 67124
Fisheries Division for address of
current Youth Director.)

Kansas Canoe Association
2319 Terry Way
Manhattan, Kansas 66502

Kansas Energy Office
214 W. 6th
Topeka, Kansas 66603

Kansas Geologic Survey
1930 Avenue A, Campus West
University of Kansas
Lawrence, Kansas 66044

Kansas Herpetological Society
Museum of Natural History
University of Kansas
Lawrence, Kansas 66045

Kansas Ornithological Society
Department of Biological Sciences
Fort Hays State University
Hays, Kansas 67601

Kansas Outdoors Unlimited
P. O. Box 470
Herington, Kansas 67449

The Kansas School Naturalist
Emporia State University
Division of Biological Sciences
Emporia, Kansas 66801

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KANSAS FISH AND GAME

Kansas Water Office
Suite 503, Kansas Avenue
Topeka, Kansas 66603

Kansas Wildflower Society
c/o Washburn University
Mulvane Art Center
Topeka, Kansas 66621

Kansas Wildlife Federation
P. O. Box 720
Junction City, Kansas 66441

Lee Richardson Zoo
Finnup Park
Garden City, Kansas 67846

Museum of Natural History
University of Kansas
Lawrence, Kansas 66045

Sedgwick County Department of Environmental Resources
Historic County Courthouse
510 N. Main Street
Wichita, Kansas 67203

Sedgwick County Zoo
5555 Zoo Boulevard
Wichita, Kansas 67212

Soil Conservation Service
USDA
P. O. Box 600
Salina, Kansas 67401

State Biological Survey
2045 Avenue A, Campus West
Lawrence, Kansas 66044

State Conservation Commission
Room 1014, 535 Kansas Avenue
Topeka, Kansas 66603

State Department of Education,
Science, Math & Environmental Education
120 East 10th Street
Topeka, Kansas 66612

State Department of Health & Environment
Forbes Field, Building 740
Topeka, Kansas 66620

State Extension Services
Kansas State University
Umberger Hall
Manhattan, Kansas 66506

State and Extension Forestry
Kansas State University
2610 Claflin Road
Manhattan, Kansas 66502

State Park & Resources Authority
503 Kansas Avenue
P. O. Box 977
Topeka, Kansas 66601

Topeka Zoological Park
635 Gage Boulevard
Topeka, Kansas 66606

Wildlife Society Kansas Chapter
(Contact Kansas Fish & Game Commission,
RR 2, Box 54A, Pratt, Kansas 67124
for current president's address)

National Organizations

American Fisheries Society
5410 Grosvenor Lane
Bethesda, MD 20814

American Fishing Tackle Manufacturers Association
20 N. Wacker Drive
Chicago, IL 60606

American Forest Institute
1619 Massachusetts Avenue, N.W.
Washington, D. C. 20036

Boy Scouts of America
National Office
1325 Walnut Hill Lane
Irving, Texas 75062

Bureau of Land Management
U. S. Department of Interior
Washington, D. C. 20240

Center for Action on Endangered Species
175 West Main Street
Ayer, Massachusetts 01432

Center for Environmental Education
625 Ninth Street, N.W.
Washington, D. C. 20001

Ducks Unlimited, Inc.
P. O. Box 66300
Chicago, Illinois 60666

DU Kansas Regional Office
1004 West Ninth
Pratt, Kansas 67124
(check local chapter)

Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

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KANSAS FISH AND GAME

ERIC Clearinghouse for Science, Mathematics, and Environmental Education
The Ohio State University
School of Natural Resources
1200 Chambers Road, 3rd Floor
Columbus, Ohio 43212

Forest Service
U. S. Department of Agriculture
P. O. Box 2417
Washington, D. C. 20013

The Garden Club of America
598 Madison Avenue
New York, New York 10022
(check local group)

Girl Scouts of the U.S.A.
830 Third Avenue
New York, New York 10022
(check local group)

Izaak Walton League of America
1800 North Kent Street, Suite 806
Arlington, Virginia 22209
(check local group)

National Association of Biology Teachers
11250 Roger Bacon Drive
Reston, Virginia 22090

Kansas Association of Biology Teachers
(Contact State Department of Education
Science Coordinator for current address.)

National Association for Environmental Education
P. O. Box 400
Troy, Ohio 45373

National Audubon Society
950 Third Avenue
New York, New York 10022

Kansas Regional Office
813 Juniper Drive
Manhattan, Kansas 66502
(check local group)

National Park Service
U. S. Department of Interior
Interior Building
Washington, D. C. 20240

National Science Teachers Association
1742 Connecticut Avenue, N.W.
Washington, D. C. 20009

State Chapter
Kansas Association of Teachers of Science
Contact: State Dept. of Education
Science Coordinator for information

National Shooting Sports Foundation
1075 Post Road
Riverside, Connecticut 06878

National Wild Turkey Federation
Wild Turkey Bldg., P.O. Box 530
Edgefield, South Carolina 29824

National Wildlife Federation
1412 16th Street, N.W.
Washington, D. C. 20036

The Nature Conservancy
Suite 800, 1800 N. Kent Street
Arlington, Virginia 22209

Natural Science for Youth Foundation
763 Silvermine Road
New Canaan, Connecticut 06840

Quail Unlimited
P.O. Box 10041
Augusta, Georgia 30906

Safari Club International
5151 E. Broadway, Suite 1680
Tucson, Arizona 85711

Sierra Club
530 Bush Street
San Francisco, California 94108
(check for local group)

Smithsonian Institution
1000 Jefferson Drive, S.W.
Washington, D. C. 20560

Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 2890
Washington, D. C. 20013

Sport Fishing Institute
Suite 503
719 13th Street, N.W.
Washington, D. C. 20005

U. S. Fish and Wildlife Service
Department of the Interior
Washington, D. C. 20240

The Wilderness Society
1901 Pennsylvania Avenue, N.W.
Washington, D. C. 20006

Wildlife Management Institute
709 Wire Building
1000 Vermont Avenue, N.W.
Washington, D. C. 20005

The Wildlife Society
5410 Grosvenor Lane
Bethesda, Maryland 20814

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KANSAS FISH AND GAME

Glossary

Many of the terms below have been defined in the booklets or worksheets in the preschool through sixth grade units. Other words may come up in conversations with students or in your research. Check an ecology or biology book for further definitions and information. Definitions are taken from context of use in texts and the following sources:

Multidisciplinary Wildlife Teaching Activities, by William R. Hernbrode; *Project Learning Tree*, by the American Forest Institute, Inc.; and *The Random House Dictionary of the English Language, College Edition*.

ACRE—A unit of land equal to 43,560 square feet or 1/640 square mile.

ADAPT—To make suitable to environmental conditions; adjust.

AMPHIBIAN—Cold-blooded vertebrates that are covered with moist skin and live partially in an aquatic habitat and partially on dry land. This group includes frogs, toads, and salamanders.

ANNUAL TURNOVER—The rate of replacement of individual animals in a population. Bobwhite quail may have a 70 percent annual turnover. Only 30 percent of the birds alive at the beginning of the year are alive at the end of the year.

ANTLER—Bone-like growth on members of the deer family that falls off and grows back each year. Horns differ from antlers because they do not fall off each year. A few horned animals drop the outside sheath of the horn (such as antelope).

AQUATIC—Living or growing in water.

ARACHNID—Any arthropod in the class *Arachnida*. Includes spiders, scorpions, mites, ticks, etc.

BAG LIMIT—The number allowed to be harvested in regulated hunting and fishing. A hunter may remove four pheasants each day. This is a bag limit.

BIG GAME—Large, hunted animals, such as antelope and deer. Examples of small game are rabbits, squirrels, pheasants, quail, etc.

BIOME—A complex of communities characterized by a distinctive type of vegetation and maintained under the climatic conditions of the region.

BIOTIC COMMUNITY—The living organisms in a community. Includes all plants and animals in the community. The non-living parts would be the abiotic parts of the community.

BLIND—A hiding place for observing or photographing.

BOOMING GROUND—An area in the prairie used by prairie chickens for their mating dance. The male birds make a booming sound while they dance to attract females.

BOTTOMLAND—Low-lying land, usually near a river.

BOUNTY—An old practice of paying for removing certain animals. This was thought to be useful in reducing pest animals but proved to be impractical.

BROWSE—This word can be a noun or verb. Brushy vegetation used by animals as food (noun). To eat the twigs and leaves of woody, brushy plants (verb). Deer, elk, and moose are browsers.

BRUSH PILE—Branches and other vegetation piled together for wildlife cover.

BURROW—A hole or tunnel in the ground made by a small animal for habitation and refuge.

CAMOUFLAGE—Color and/or pattern that blend into the environment.

CARNIVORE—Meat eater.

CARRION—Dead animals in the process of decaying. Crows feed on carrion.

CARRYING CAPACITY—The number of animals of a species that can be supported in a particular habitat at any given time. This number will change with the season, and from year to year. It depends on competition from other animals, rainfall, and other weather factors.

CHANNELIZATION—Changes made to a river bed to straighten, widen, or deepen it. Used in land reclamation, and mistakenly used in flood control attempts but is very harmful to the river habitat.

CLASSIFICATION—The assignment of plants and animals to groups within a system of categories distinguished by structure, origin, etc.

CLEARCUT—A logging practice that removes all the trees in an area.

COLD-BLOODED—Describes animals that change body temperature to match their surroundings.

COMMUNITY—A group of plants and animals living in a particular location and interacting with each other.

COMPETITION—Struggle among organisms for food, space, cover, and other requirements for existence.

CONSERVATION—The wise use of natural resources to assure their presence in the future.

CONSUMER—Uses plants or animals as food. Eats producers. A primary consumer, such as a rabbit, eats plants. A secondary consumer, such as a fox, eats primary consumers.

COVER—Shelter provided by vegetation, debris, and irregularities of the land. Used by wildlife for sleeping, hiding, feeding, and breeding areas.

COVEY—A small flock or group. Quail are often found in a covey.

CRITICAL HABITAT—Includes the areas of land, water, and air space occupied by an endangered species at the time this species is listed. This habitat is classified by the federal government as being necessary for the species' survival.

CRUSTACEAN—Any chiefly aquatic arthropod of the class *Crustacea*. Usually has a hard shell or crust covering the body. Includes lobsters, shrimps, crabs, barnacles, etc.

DABBLING DUCKS—Ducks that live near shallow marshes, ponds, and rivers. They tip their tails up to feed, with the majority of their bodies above water. These ducks take off in vertical flight when startled. Also called "puddle ducks."

DECOMPOSER—Plants and animals that feed on dead material and cause it to mechanically or chemically break down. Examples include bacteria, fungi, and earthworms.

DEN—A secluded place, as the lair of a predatory animal.

DINGELL-JOHNSON FEDERAL AID IN FISHERIES RESTORATION ACT—D-J funds provide federal cost shares for fisheries projects. Funds provided by an excise tax on some fishing equipment.

DIURNAL—Active during the day. Opposite of nocturnal.

DIVING DUCKS—Ducks that prefer deep water as in lakes and bays. They feed by diving below the surface and take flight from a running start.

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DOMESTIC ANIMALS—Animals of the home or farm, such as dogs, cats, chickens, etc.

ECOLOGY—The scientific study of the relations of living things to one another. A scientist who studies these relationships is called an ecologist.

ECOSYSTEM—A system formed by the interaction of a community of organisms with each other and their nonliving environment.

EDGE EFFECT—The tendency of wildlife to concentrate at the edges of two adjacent vegetative or land use types. The combination of habitats provides extra food and shelter.

ENDANGERED—Species that are in danger of becoming extinct throughout all or a significant portion of their range.

ENVIRONMENT—The total of all surroundings including air, water, plant life, people, and wildlife. Physical and biological factors included.

ESTIVATE (Aestivate)—To spend the summer in a torpid, or dormant, condition.

EXOTIC—In conservation terminology, this refers to a foreign plant or animal that has been introduced into a new area. The ring-necked pheasant is an exotic introduced to the U. S. from Asia.

EXTINCT—Species that no longer exist. Examples include passenger pigeon, great auk, and the sea mink.

EXTIRPATED—Describes species that were removed in a particular area but are found elsewhere. Mountain plover were extirpated from Kansas and have only recently been reintroduced.

FENCEROW—Vegetation growing along a fence. Often used by wildlife for cover.

FISH AND GAME COMMISSION—Organization that has responsibility for the wildlife and habitat in the state. Each of the 50 states has a similar organization.

FLYWAY—Flight routes used by migratory birds. Kansas is in the Central Flyway.

FOOD CHAIN—The sequence by which energy is passed from sun to plants to animals. A green plant is eaten by an insect that is eaten by a bird, forming a simple food chain.

FOOD WEB—An interconnection of food chains.

FORAGE—Used as a verb and a noun. Refers to vegetation taken by herbivores (noun). Act of taking the vegetation (verb).

FORBS—For wildlife use, forbs are weeds and herbs, low-growing annual or perennial herbaceous plants.

GAME—Animals that can legally be hunted, fished, or trapped.

GENUS—Used in plant and animal classification as the subdivision of families or subfamilies. A genus usually has more than one species. The genus *Canis* includes dogs, wolves, coyotes, etc.

GRANIVORE—Grain eater.

HABITAT—The place in which an animal lives. It must include food, water, and cover. This involves escape cover, winter cover, cover to rear young, and space to play. Loss of habitat is the biggest single threat to wildlife.

HARE—Rodent-like mammals of the genus *Lepus* having long ears, a divided upper lip, and long hind limbs adapted for leaping. Distinguished from rabbits by having young that leave the nest in 24 to 48 hours. Hares are generally larger than rabbits. Jack rabbits are hares.

HERBIVORE—Plant eater.

HIBERNATE—Spending winter, or a portion of it, in a state of sleep; a torpid or resting state.

HUNT—To search for game animals for the purpose of catching or killing. Hunting is now regulated under comprehensive laws in every state. Sport hunting removes the surplus of wildlife as opposed to market hunting in pioneer days when nearly all edible or useful forms of wildlife were taken almost without restriction.

INTERACTION—The relationship of one organism to another. The action of one population affecting the growth or death rate of another population. One population may eat members of other populations, compete for food, etc. Interactions can be positive, negative, or neutral.

INTERDEPENDENCE—The interrelationships of wildlife with one another and with the various elements of their environment.

INTERSPERSION—Mixing of habitat types. Interspersion of habitat creates edge.

INVERTEBRATE—Animal without a backbone.

KINGDOM—A province of nature. The animal, vegetable, and mineral kingdoms.

LARVA—Immature, wingless, feeding stage of an insect that undergoes complete metamorphosis. Also the young of any invertebrate.

LIFE CYCLE—The continuous sequence of changes undergone by organisms from one primary form to the development of the same form in a subsequent generation. Immature animals grow, reproduce, and leave more immature animals, defining the species' life cycle.

LIMITING FACTOR—Anything that controls the density of a population within its habitat. Factors include the quality and/or quantity of food, water, cover, predators, disease, and climate.

MAMMAL—Any vertebrate of the class *Mammalia* including humans. All members of this class have hair on their bodies and feed their young milk.

MARSH—A tract of low wetlands generally supporting cattails and other reeds, muskrats, mink, red-winged blackbirds, and a wide variety of other species.

MICROCLIMATE—The environmental conditions in a restricted area. A shady area of cottonwoods in the sunny prairie may create a microclimate.

MIGRATORY—Birds and other animals that make an annual trip to a different area. Distance may be long or short, depending on the species. Sandhill cranes migrate through Kansas on their way to Texas for the winter and Canada for the summer.

MIMICRY—The close external resemblance of an animal to another animal or its surrounding. Often serves as protection or concealment. Imitate; simulate.

MOLLUSK—Any invertebrate of the phylum *Mollusca* comprising the chitons, snails, bivalves, squids, octopuses, etc. Typically have a hard shell.

MOLT—To shed worn feathers or skin so they can be replaced, or to lose one seasonal coat so it can be replaced by another.

MONOCULTURE—Vegetation of a single species, generally even-aged. This situation allows for little wildlife diversity and is potentially dangerous because it is more susceptible to disease.

MORTALITY RATE—The relative frequency of death in a community.

MUTUALISM—A close association between two different species whereby each species gains some benefit.

NATALITY RATE—Rate of birth.

NATIVE SPECIES—An animal or plant indigenous to a particular region.

NATURAL SELECTION—Process resulting in the survival and perpetuation of only those forms of plant and animal life that are able to adapt to the environment.

NOCTURNAL—Active at night; opposite of diurnal.

NONGAME—Animals that are not hunted, fished, or trapped; this includes the threatened and endangered species, song birds, etc.

NONRENEWABLE RESOURCES—Resources, such as soil and minerals, which cannot be regenerated by themselves.

OMNIVORE—Animal that eats both plants and animals.

ORGANISM—A form of life composed of mutually dependent parts that maintain various vital processes; any form of plant or animal.

PARASITE—An animal or plant that lives on or in an organism of another species from whose body it obtains nourishment.

PESTICIDE—Chemical preparation used to control populations of organisms.

PHOTOSYNTHESIS—The process by which green plants convert carbon dioxide and water into simple sugar. Chlorophyll and sunlight are essential to the series of complex chemical reactions involved.

PHYLUM—The major subdivision of the animal kingdom, consisting of one or more related classes.

PITTMAN-ROBERTSON FEDERAL AID IN WILDLIFE RESTORATION ACT—Funds gathered from an excise tax on sporting arms and ammunition for wildlife management and research use. A cost-sharing program of the federal government with the states.

PLANKTON—Organisms (usually microscopic) suspended in aquatic habitat. Includes bacteria, algae, protozoans, rotifers, etc. Phytoplankton are the plant plankton; zooplankton are the animal species.

POLLUTION—Harmful substances deposited in the air, water, or land which lead to a state of impurity and, often, unhealthiness.

POPULATION—All the individuals of a particular species in a given area.

PREDATOR—An animal that hunts other animals for its food.

PRESCRIBED BURNING—Planned application of fire to a predetermined area. A technique used in wildlife management to gain regrowth of certain vegetation.

PREY—Animals that are hunted for food by other animals.

PRODUCER—Organisms eaten by consumers. Green plants are primary producers; they are able to make food from sunlight and organic substances.

PRONGHORN—The proper name for the American antelope, *Antilocapra americanus.* Not a true antelope; does not have true horns. Pronghorns belong to a family by themselves. They are not found outside of North America.

RANGE—(a) Home range: the geographic area in which an individual animal resides. (b) an area grazed by livestock and/or wildlife. (c) all lands including forest land that produce native forage, in contrast to land cultivated for agricultural crops or carrying a dense forest.

RAPTOR—Bird of prey, such as eagles, hawks, and owls. Predatory birds.

RECYCLING—The salvage and reprocessing of used materials, such as paper, glass, and aluminum.

REFORESTATION—The replanting of trees in forests that have been affected by cutting, fire, disease, etc.

REFUGE—A wildlife sanctuary. National wildlife refuges are located across the United States. Kirwin, Quivira, and Flint Hills NWR are in Kansas.

REINTRODUCTION OF SPECIES—A wildlife management technique in which a species is reintroduced into its historic range, replanted in areas where it was extirpated.

RENEWABLE RESOURCES—Resources, such as trees and wildlife, that renew themselves naturally.

REPTILE—Any cold-blooded, scaled vertebrate of the class *Reptilia*, including turtles, lizards, snakes, and crocodiles.

RESERVOIR—A place where water is collected and stored for use. Kansas has approximately 25 reservoirs, such as Cheney, Wilson, and Clinton.

RESIDENT WILDLIFE—Animals that are residents of a specific area on a year-round basis, as opposed to migratory.

RIPARIAN—Dwelling on the bank of a river or other body of water. Riparian habitat is situated along a river.

RIPRAP—A quantity of stone placed in water for fish cover, and to prevent bank erosion.

ROADSIDE DITCH—Areas bordering roads; can be excellent for wildlife habitat if they are left to grow and have diverse vegetation. Too often, these areas are mowed and their use to wildlife reduced or removed.

RODENT—A gnawing or nibbling mammal, including mice, squirrels, and rabbits. Animals in the order *Rodentia*.

SACS—The baglike structure in an animal or plant. The prairie chicken has orange sacs on the sides of its neck.

SCAVENGER—An animal that eats the dead remains and wastes of other animals and plants. Dermestid beetles are scavengers.

SEASON (OPEN SEASON)—In wildlife terminology, season refers to a time when hunting and fishing is permitted for a particular species. May be a few days or year-round.

SEDGE—A rush or grass-like plant growing in wet places; sawlike edge to blade of plant.

SHELTER—Cover; cover from elements for raising young, to travel in, for breeding, sleeping, etc. Varies by species.

SHELTERBELT—Rows of trees and shrubs generally on the north and west sides of farms, homes, or fields; protects from weather and provides wildlife habitat.

SKINK—Any of a family of small, smooth-scaled lizards.

SLOUGH—An inlet from a river; backwater; tide flat, a creek in a marsh.

SMALL GAME—A hunting term designating smaller hunted species, such as rabbits, squirrels, quail, etc. Compare with "big game."

SPECIES—A group of individuals that resemble one another and are able to breed among themselves but not able to breed with members of another species. A category of biological classification immediately below the genus or subgenus. Species is both singular and plural.

STEWARDSHIP—The concept of land responsibility--that we do not own land but are managers of the resource and responsible to future generations for the condition of the land when we leave it.

STRESS—Usually thought of as a physical factor that applies to detrimental pressure to an organism or population. A drought might stress an animal population possibly resulting in inhibited reproduction.

SUCCESSION—The orderly, gradual, and continuous replacement of one plant or animal by another. A bare field will gradually develop into a woodland if not disturbed by fire, mowing, etc.

SURPLUS—That quantity of wildlife above the carrying capacity. The surplus is removed by disease, starvation, hunting, or predation.

TALON—A claw from a bird of prey.

TERRITORY—An area defended by an animal against others of the same species. Used for breeding, feeding, or both. Wolves are territorial.

THREATENED—Species of plants and animals that are protected by law and are limited in number or range or both. May become endangered if reduction continues.

UNGULATE—A hoofed mammal.

UNITED STATES FISH AND WILDLIFE SERVICE—The federal organization responsible for wildlife on the national level. This organization sets standards and gives guidance to the state wildlife agencies.

UPLAND—The higher ground of a region; above the level where water flows. Upland game animals include prairie chicken, turkey, pheasant, quail, etc.

VERTEBRATES—Animals with backbones.

WARM-BLOODED—Animals that are able to maintain a fairly constant body temperature independent of their environments, as opposed to cold-blooded animals.

WATERFOWL--Water birds; usually ducks and geese but may be used in referring to shore birds and wading birds as well.

WILDFIRE—Any fire other than a controlled or prescribed burn occurring on wild land.

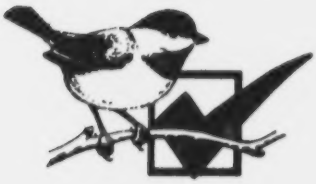
WILDERNESS AREA—An area established by the federal government to conserve its primeval character and influence for public enjoyment under primitive conditions in perpetuity.

WILDLIFE—All wild, living animals. Includes birds, fish, mammals, reptiles, amphibians, insects, mollusks, crustaceans, etc. Occasionally, the term is even applied to plants. Game and nongame animals are wildlife.

WILDLIFE MANAGEMENT—An effort based on the science of ecology and designed to maintain wildlife at certain population levels. This effort entails habitat manipulation and an understanding of wildlife population dynamics, diseases, behavior, and reproduction. This is done by wildlife managers working for the Fish and Game Commission and by other interested individuals and groups.

WILDLIFE RESEARCH--Investigating wildlife to gain information that can be used to better manage wildlife. Examples of projects might include taking a survey or census of populations, gathering and analyzing data about animal behavior, and studying and comparing the interaction of wildlife within habitats.

ZOOLOGY—The study of animals; a branch of biology.



This program was funded from hunting and fishing license fees and partially by the Nongame Wildlife Tax Check-Off Program.

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EQUAL OPPORTUNITY EMPLOYER

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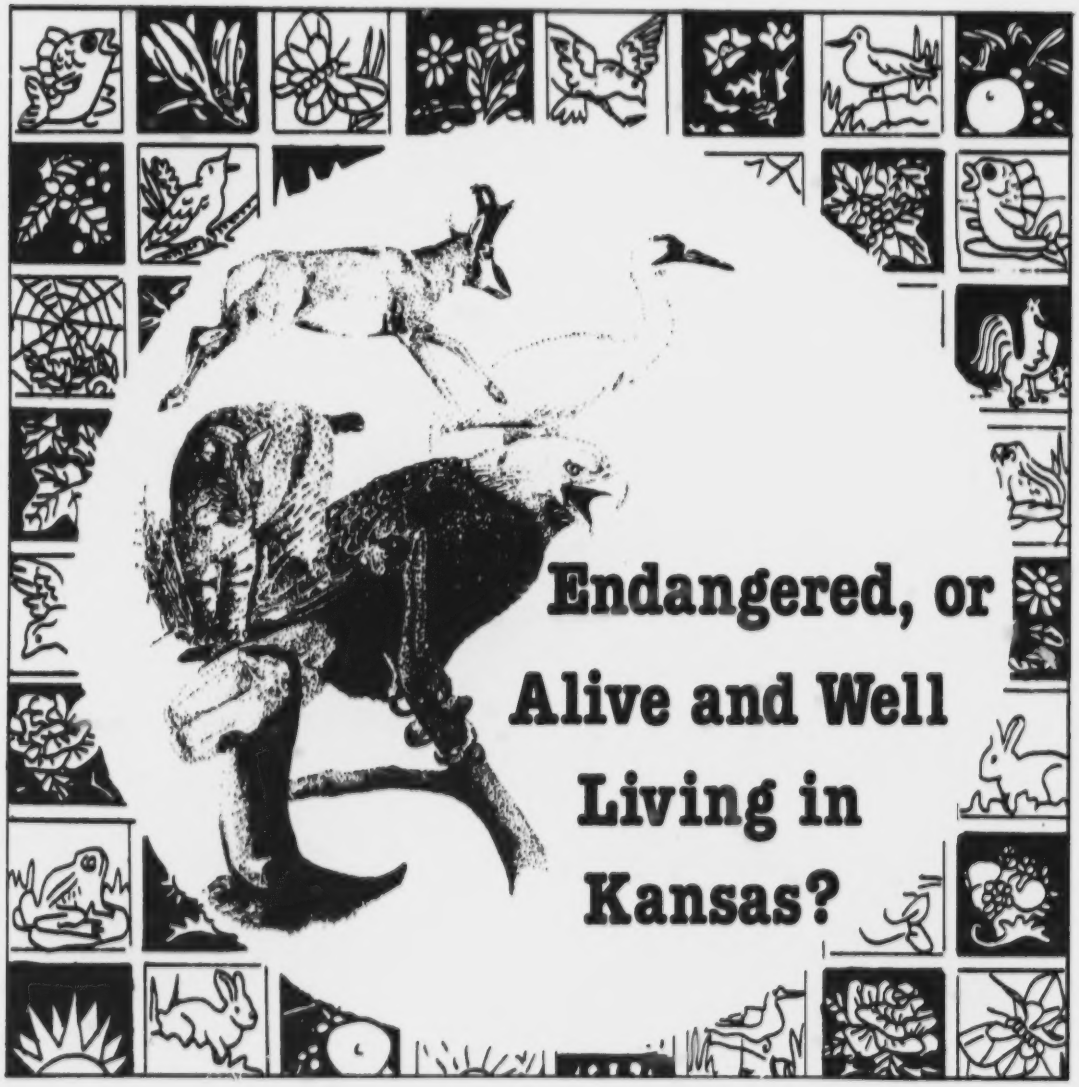
KANSAS FISH AND GAME



Endangered, or Alive and Well Living in Kansas?

Student Manual

wildlife education service

KANSAS FISH AND GAME

NONCONSUMABLE

4

Comprehensive program written and developed by
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Design and Illustration by
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Wildlife Education Service
A series of wildlife education materials for Kansas youth
from the Kansas Fish & Game Commission

The elementary series includes:

Preschool-Kindergarten	WILDLIFE IS BASIC
1st grade	WILDLIFE AND ME
2nd grade	FOOD FOR WILDLIFE
3rd grade	WILDLIFE NEEDS A PLACE TO LIVE
4th grade	ENDANGERED, OR ALIVE AND WELL LIVING IN KANSAS
5th grade	HOW DO WE GROUP WILDLIFE
6th grade	HOME IS WHERE THE HABITAT IS

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ENDANGERED, OR ALIVE AND WELL LIVING IN KANSAS?

The words "threatened" and "endangered" are often used to describe the condition of certain animals. After hearing so much about animals that are reduced in number, you might think that all of them are endangered. This booklet will help you understand what the words "threatened" and "endangered" mean and which animals in Kansas fit those categories.

First, a look at the words–

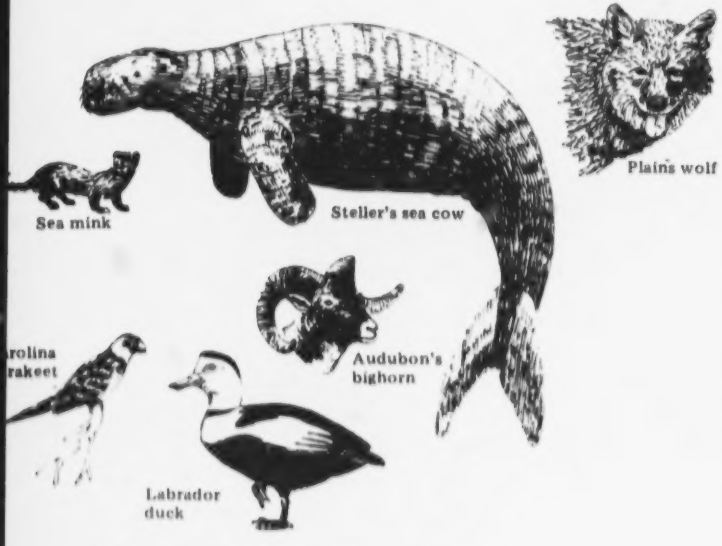
An **extinct species** (kind) of animal or plant no longer exists. There will never be any more.

An **endangered** species is in danger of becoming extinct and has special protection by law.

A **threatened** species may become endangered in the future. Such species have special protection by law.

Since the beginning of time, animals have become extinct. The dinosaurs are a famous example of this kind of extinction. They disappeared because they could not survive natural changes in the environment. However, we can't blame natural change for the great loss of wild animals and plants we are experiencing today. People are making rapid changes in the environment and causing many species to become extinct. One of the best known of these is the passenger pigeon.

The passenger pigeon lost its forest **habitat** (place where it lives) when white settlers moved into North America. The birds were also shot and trapped without any controls. They were sold to markets for food. The species could not adapt to these great changes quickly enough. The skies were once filled with billions of passenger pigeons. The last one died in a zoo in 1914.

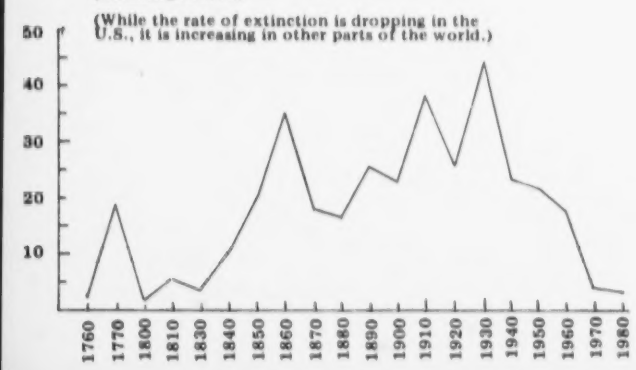


Many other American animals have also become extinct: the Steller's sea cow (1768), the sea mink (1890), the Audubon's bighorn sheep (1918), the plains wolf (about 1926), the Labrador duck (1872), the Carolina parakeet (about 1920), the Lanai thrush (1931), the heath hen (1932), the harelip sucker (1900), the Gorgonio trout (about 1935), and the Tecopa pupfish (1982).

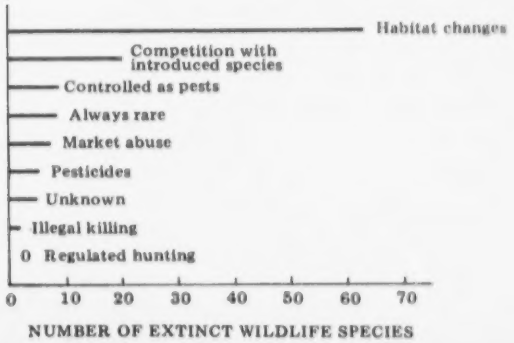
Today, scientists estimate that somewhere in the world one species of plant or animal becomes extinct every day. They expect the rate of extinction to be one species per hour by the year 2000. This will include some animals that are not yet discovered.

EXTINCTIONS IN THE UNITED STATES
(including Hawaii)

(While the rate of extinction is dropping in the U.S., it is increasing in other parts of the world.)



REASONS FOR EXTINCTION



NUMBER OF EXTINCT WILDLIFE SPECIES

Why have we lost so many species, and why are others endangered?

The biggest reason is loss of habitat. Habitat provides food, water, and shelter for wildlife. People have destroyed many of the habitats that were in North America when the Mayflower arrived. They have plowed prairies, drained swamps and marshes, channeled streams and built dams. Some of the animals that lived in these habitats were able to change their habits and survived in the farmlands and towns that grew up. The whitetail deer, cottontail rabbit, and robin all **adapted** to the new habitats we provided.

Other animals, like the ivory-billed woodpecker and dusky seaside sparrow, could not make the change and are thought to be extinct.

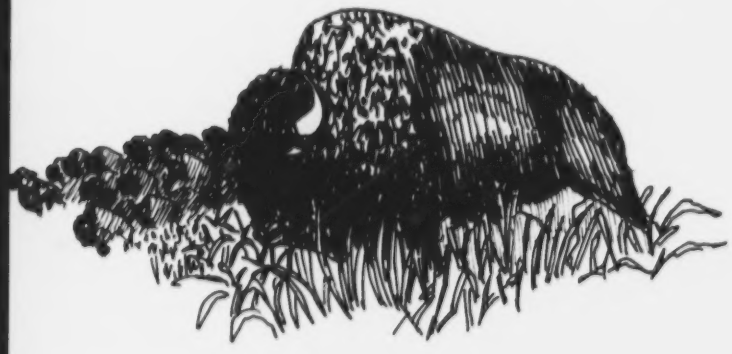
Since we have settled North America, we have brought in many new animals. Some of them are **domestic** species – the chickens, cattle, goats, and other animals we raise on the farm for food. Others are **exotic** wild animals, like the house sparrow and starling, which someone wanted to have in this country just for fun. A few of our **native** animals have had a hard time competing with these invaders. This is especially true on islands like Hawaii. Since Hawaii was discovered, 40 percent of all native Hawaiian birds have become extinct and another 40 percent are endangered. This is mainly due to competition from animals brought to the islands by white settlers. Why would this problem have a greater impact on island animals?

Another reason animals become endangered or extinct is pollution. We pollute the environment with **wastes** and **pesticides** that affect wildlife. Spraying chemicals like DDT affects the ability of some birds to have young. The chemicals collect inside a bird's body from the food it eats. When the eggs are layed, the shells are too thin to survive. Bald eagle, osprey, and peregrine falcon numbers dropped dangerously because of this egg shell thinning. Fortunately, DDT spraying is no longer allowed in the United States. But, other chemicals are used instead of DDT. We do not know how all of these chemicals affect wildlife or how they affect people. When we do something to the environment that makes it worse for wildlife, it also is worse for people.

Market Abuse

Sometimes the combination of loss of habitat and **unrestricted killing** were the causes of extinction. The great auk was caught on its nesting grounds by whalers for its eggs, feathers and oil. The birds lived in big **colonies** (groups) and were easy to catch.

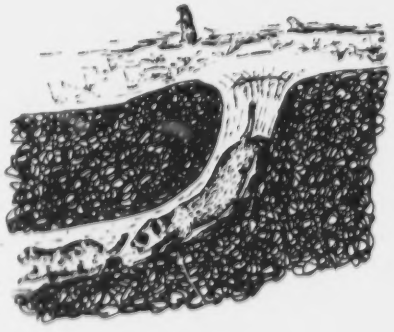
Audubon's bighorn sheep, and Merriam's elk were eliminated by settlers, prospectors, and **market hunters** looking for meat. These two animals lived in restricted habitats that people wanted to use for farming and livestock.



Buffalo, or American bison, once roamed the Great Plains of the United States. It is estimated that there once were 60 to 100 million buffalo. Market hunters reduced that herd to just a few hundred animals as they pursued the buffalo for their hides and meat. Today you can see buffalo in many places across Kansas.

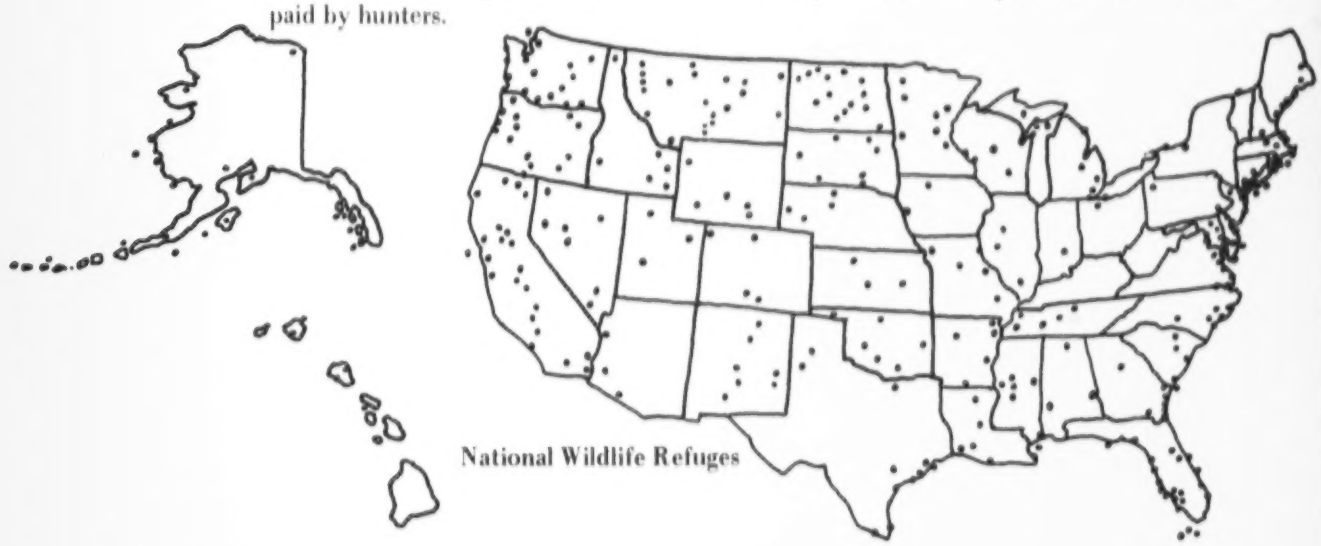
Market hunters are very different from **sport hunters**. The sport hunter takes the **surplus** (extra) wildlife that nature produces. The market hunter took nearly any wildlife that could be sold for meat, feathers, fur, or other parts. Today's laws control the number and kind of wildlife that can be hunted. Regulated sport hunting has not caused any species to become threatened or endangered. In fact, the license fees from hunting, fishing and trapping are used to manage wildlife. Sport hunting keeps animals from becoming so numerous that they overtake their food and cover supply, actually eating themselves out of house and home.

Some animals are also endangered because they are considered threats to farming and ranching. The number of bears, cougars and wolves were reduced because these animals occasionally ate livestock. Prairie dogs have been poisoned because they eat grass and dig holes where cattle graze. Prairie dogs are not endangered, but they are the main food of the black-footed ferret, now one of the rarest mammals in the United States. We need to know the impact of our actions on the environment before we act.



Some animals, like the Kirtland's warbler, have probably always been rare. This tiny bird nests only in Michigan's jack pine trees that are from 5 to 18 feet tall. Trees of the right size once grew after natural forest fires. When the number of fires was decreased, the birds' nesting habitat was greatly reduced. Today, controlled fires are used to produce more Kirtland's warbler habitat.

When populations of once abundant species, like the buffalo were greatly reduced, and others like the passenger pigeon were no longer around, people finally decided changes had to to be made. National wildlife refuges were set aside for wildlife. A **refuge** is an area where habitat is developed and protected. People are not allowed on some parts of refuges. Kirwin, Quivira, and Flint Hills national wildlife refuges are in Kansas. There are more than 380 national wildlife refuges in the United States. Many of them were purchased with license fees paid by hunters.



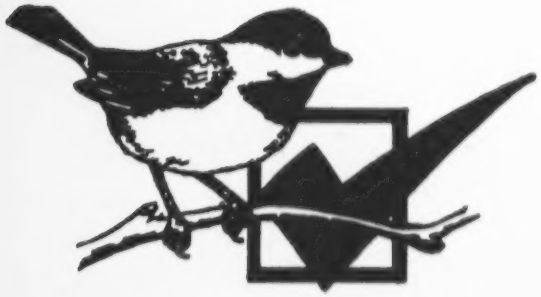
National Wildlife Refuges

Laws were also written to protect wildlife. One of the federal laws was the **Lacey Act.** It was passed in 1900 and controls animals being brought across state or country borders.

The **Migratory Bird Treaty Act (1918)** protects birds, like the whooping crane, that **migrate.** It controls their capture, sale, transport, import, and export.

The **Endangered Species Act (1973 & 1978)** protects both plants and animals that are threatened or endangered. The **critical** (needed) **habitat** of the species is also protected. The names of these plants and animals are placed on a list.

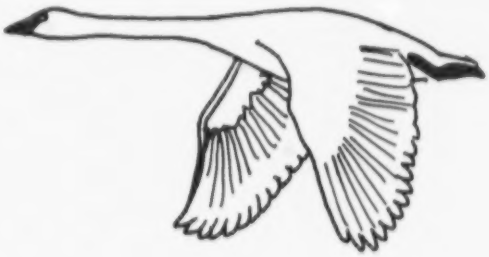
Since these and other laws have protected wildlife there has been a slower rate of extinction.



Federal and state wildlife agencies work together with private conservation groups, industry, business, citizens and foreign countries to conserve endangered wildlife. **Conservation** (wise use) programs were organized to help the species recover. Kansas Fish and Game Commission has a Nongame Wildlife Improvement Program that works with all wildlife that is not hunted, fished, or trapped. The program is nicknamed "Chickadee Check-off" because there is a place people can check-off donations to the program on their state tax form.

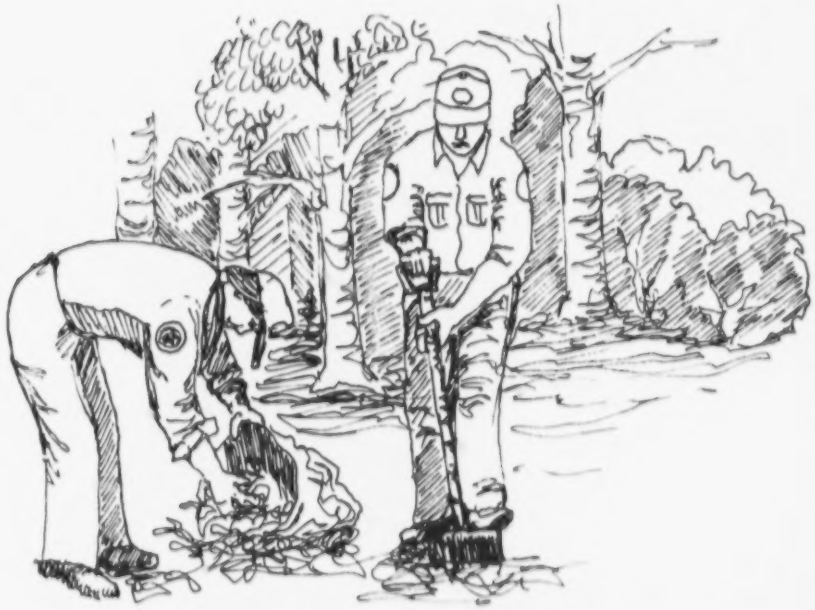
The process of having a species placed on the Threatened and Endangered List is long and requires a lot of research. The U.S. Fish and Wildlife Service is in charge of making the list and keeping it up-to-date. Once a species is added to the list it receives additional attention.

Some species, like the California condor, have been so reduced in numbers that there is little hope for their survival. Others, like the trumpeter swan, made a big come back. In 1935 there were about 73 trumpeter swans south of Canada. The areas where the trumpeter swans lived were made national wildlife refuges so that the birds and their habitat were protected. By 1970, the population had increased to around 1,000 swans.

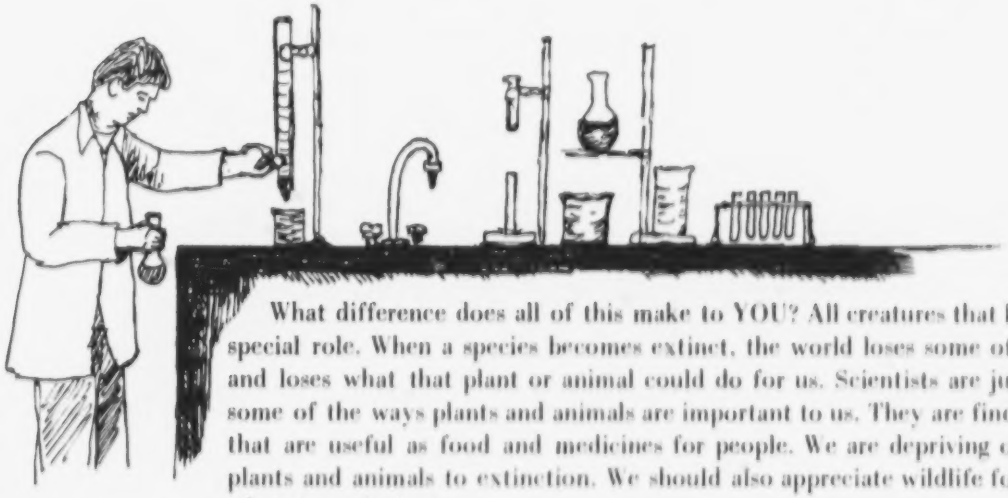


Wood ducks, whitetail deer, and pronghorn antelope are managed by wildlife biologists. Years ago their habitat was changed or lost and their numbers were low. Now, all three species are healthy and even producing a surplus. These animals are now game animals. Game animals can be hunted, fished, or trapped. They are in no danger of becoming extinct.

Not all changes are bad. Changing habitat is a tool to manage wildlife. The difference is that when wildlife managers change habitat, they change it to help wildlife. Wildlife managers cut trees, or burn an area to clear space needed for plants to grow. The plants may become food for wildlife. Wildlife managers need to know what wildlife needs are before they make any changes. Changes must be made with planning, knowledge, and responsibility!

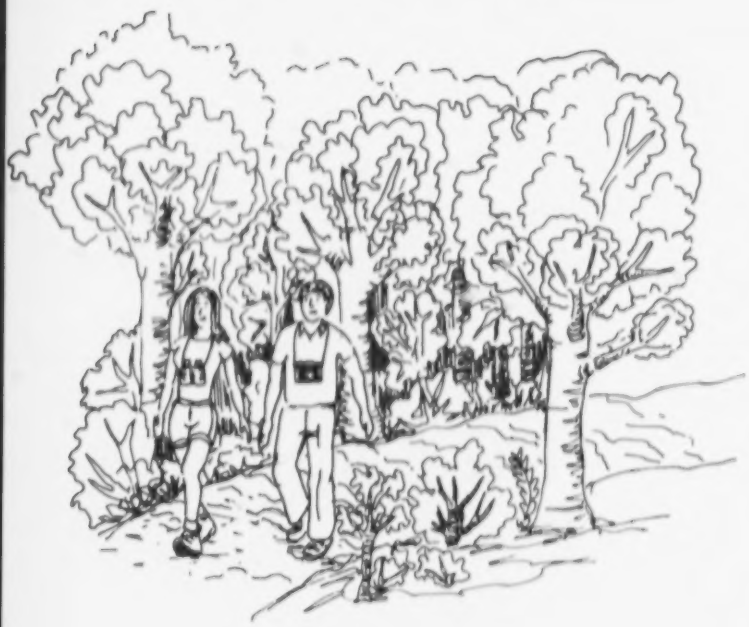


Many other species that are now threatened or endangered could be managed to bring back their numbers. To do this, wildlife managers and researchers need time, money, land, and support from the public and politicians. Enforcement of our laws is also very important. New laws are being added to help.



What difference does all of this make to YOU? All creatures that live on the earth have a special role. When a species becomes extinct, the world loses some of its variety of wildlife and loses what that plant or animal could do for us. Scientists are just beginning to realize some of the ways plants and animals are important to us. They are finding plants and animals that are useful as food and medicines for people. We are depriving ourselves when we lose plants and animals to extinction. We should also appreciate wildlife for itself, without caring what it can do for us.

Wildlife acts as a **barometer** of the environment. Wildlife is a measure of how healthy the environment is. Most wildlife is more sensitive to the environment than people are. For many years miners took canaries with them into the mines. When there was poisonous gas in the mine, the canary died. Just like canaries warning coal miners of poisonous gases, when animals become sick or die something has changed in the environment. That change may not be good for people either. Careful use of our natural resources is for the good of people as well as wildlife.



Many people enjoy wildlife and give it a value that has nothing to do with money. These people enjoy watching, photographing or hunting wild animals and would like to see them in the wild. Can you think of a time that you spent enjoying wildlife?

Because of the way people have behaved, the only place you can see some wild animals is in a zoo. Zoos are home for some threatened and endangered species. They are great places for scientists to study animals and for people to see animals. But, wouldn't it be a shame if zoos were the only place you could see wildlife?

Let's take a closer look at what the situation is in Kansas. Kansas has the following animals on its threatened and endangered list:

ENDANGERED

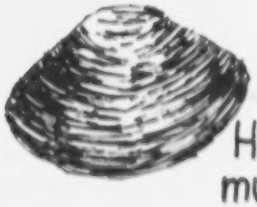
Black-footed ferret
Gray bat
Peregrine falcon
Whooping crane
Eskimo curlew
Bald eagle
Neosho madtom
Pallid sturgeon
Sicklefin chub
Central newt
Grotto salamander
Cave salamander
Graybelly salamander
Warty-backed mussel
Heel-splitter mussel
Pomatiopsis lapidaria (small snail)

THREATENED

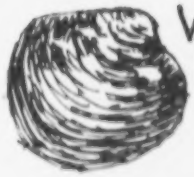
Prairie falcon
Least tern
Blue sucker
Arkansas darter
Topeka shiner
Alligator snapping turtle
Northern crawfish frog
Riffle beetle

wildlife education service

ENDANGERED SPECIES OF KANSAS



Heel-splitter mussel



Warty-backed mussel

Pomatiopsis lapidaria (small snail)

Cave salamander

Pallid sturgeon

Whooping crane

Peregrine falcon

Neosho madtom

ENDANGERED SPECIES OF KANSAS

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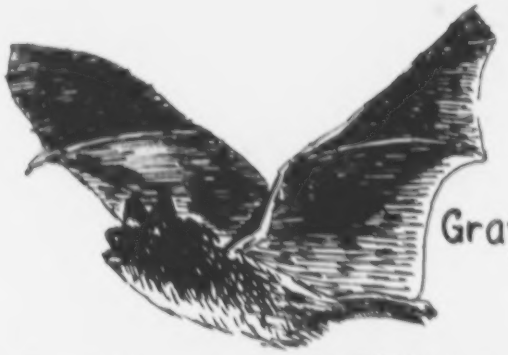
KANSAS FISH AND GAME

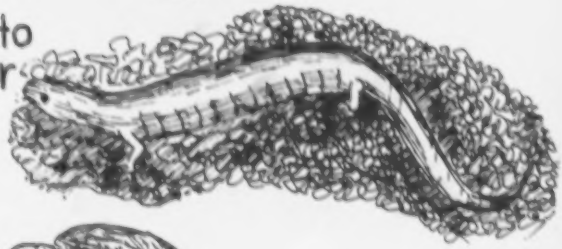
Central newt

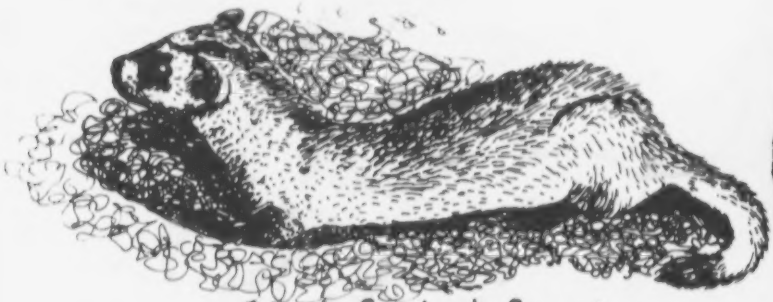


Gray bat

Graybelly salamander

Grotto salamander





Black-footed ferret

Bald eagle

Eskimo curlew

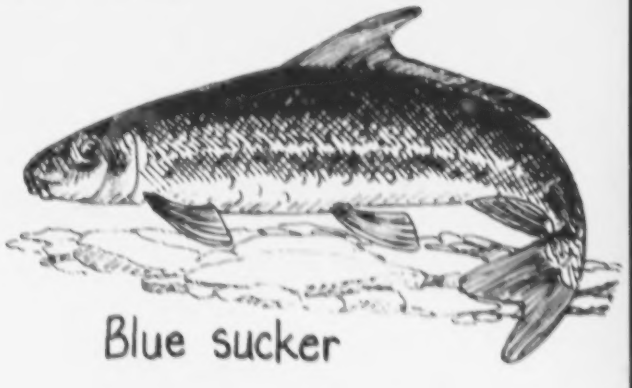
Sicklefin chub

THREATENED SPECIES OF KANSAS

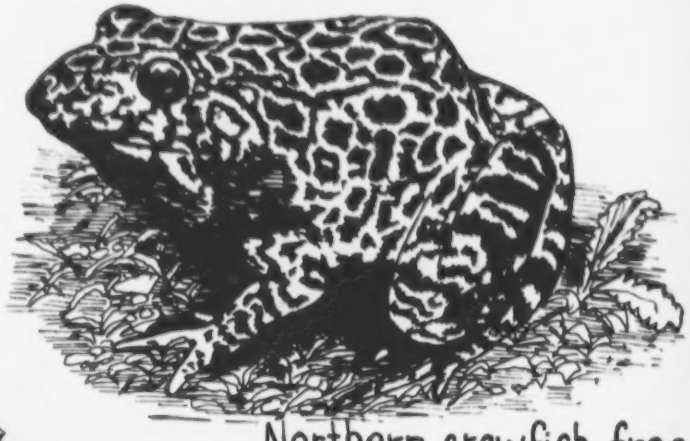
Arkansas darter

Riffle beetle

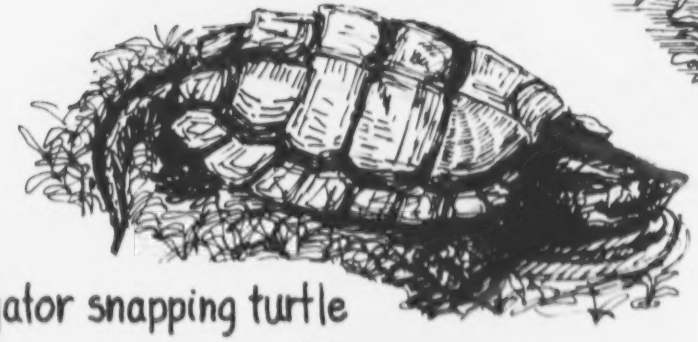
Prairie falcon



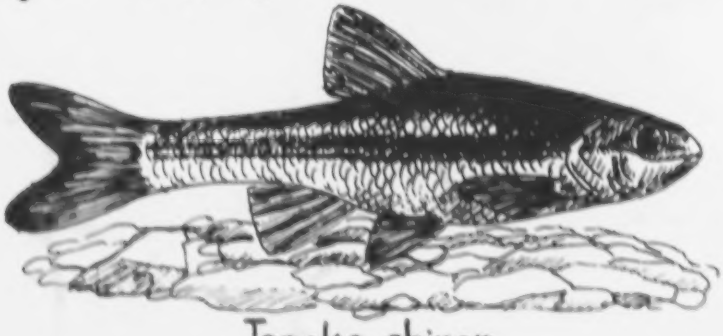
Blue sucker



Northern crawfish frog



Alligator snapping turtle



Topeka shiner

Least tern

71

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ENDANGERED, OR ALIVE AND WELL

Kansas Endangered Species Chart

The chart below gives you an idea of how the endangered animals of Kansas are doing and why they are endangered.

ENDANGERED SPECIES	STATUS	REASONS FOR ENDANGERMENT
Black-footed ferret	No change	Habitat loss and prairie dog control
Gray bat	Decreasing	Insecticides and human disturbance at nursery
Peregrine falcon	Possible increase	Insecticides
Whooping crane	Increase	Habitat loss and market hunting in 1800's
Eskimo curlew	No change (last seen in 1891)	Not known; probably habitat loss and market hunting in 1800's
Bald eagle	Increase	Habitat loss, pesticides and predator control
Neosho madtom	No change	Habitat loss and pollution
Pallid sturgeon	No change	Habitat loss
Sicklefin chub	Decreasing	Habitat loss
Central newt	No change	Habitat loss (border species)
Grotto salamander	No change	Habitat loss (border species) (most endangered amphibian in Kansas)
Cave salamander	No change	Habitat loss (border species)
Graybelly salamander	No change	Habitat loss (border species)
Warty-backed mussel	Increase	Pollution
Heel-splitter mussel	Increase	Habitat loss
Pomatiopsis lapidaria (small snail)	No change	Habitat loss

The outlook isn't all gloomy. We don't need to worry about all wildlife becoming extinct. What we need to do is work at having enough habitat for wildlife to survive. As the number of people in the world increases, the amount of wildlife habitat decreases.

When **colonists** first arrived in the country they found an abundance and variety of wildlife. They thought that since there were so many animals, the supply of wildlife would never end. We see where that kind of thinking leaves us. Populations of some of those species have been restored so that we can still enjoy a variety of wildlife although not nearly as great a variety as the colonists had. It's not too late to help.

What can you do to help endangered species?

1. Learn more about the threatened and endangered species in Kansas, the United States and the world. Find out where they are living. Discover what is being done to protect their habitat and join in the work. There's a lot of misinformation on this topic; be careful to get the facts.

2. What kinds of environmental pollution are allowed and why? Let your state and federal government officials know how you feel about this and what you think should be done. See what you can do to reduce pollution by talking to the people involved (industry, agriculture, individuals).

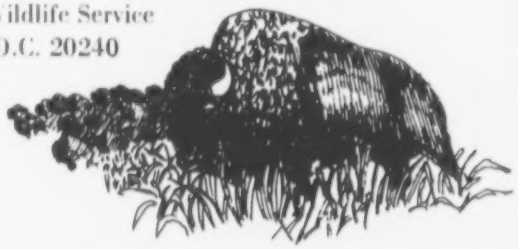
3. If you know of places where wildlife habitat is being destroyed, find out why. Try to find ways to stop or reduce the damage.

4. Be informed on current wildlife issues. Learn all you can about threatened and endangered species, and share what you learn with others. You can get a copy of the endangered species list and other information from the :

   U.S. Fish & Wildlife Service
   Regional Office
   P.O. Box 25486
   Denver Federal Center
   Denver, Colorado 80225

   Office of Endangered Species
   U.S. Department of the Interior
   U.S. Fish & Wildlife Service
   Washington, D.C. 20240

   National Wildlife Federation
   1412 16th Street N.W.
   Washington, D.C. 20036



5. Join conservation organizations to help protect nongame and endangered wildlife. A healthy environment will help all living things.

6. Kansas nongame and endangered species can be helped through donations. The Nongame Check-off on the Kansas tax form gives taxpayers an opportunity to donate money to help wildlife that is not hunted, fished or trapped.

7. Learn more about the laws protecting wildlife. The Kansas Nongame and Endangered Species Act was passed by the Kansas legislature in 1975. On a national level, several laws have been passed. A few of the better known laws are: The Lacey Act of 1900, the Migratory Bird Treaty Act (1918), the Bald Eagle Protection Act of 1940, the Fish and Wildlife Act of 1956, the National Wildlife Refuge System Administration Act of 1966, the Endangered Species Preservation Act of 1966, the Endangered Species Conservation Act of 1969, and the Endangered Species Acts of 1973 and 1978. Where, if any, are the weaknesses in the laws? Write a law you think will conserve all endangered plants and animals.

8. To better understand the ecosystem that all living things are a part of, play the "Food Web Game". Your teacher has the directions in the Teacher's Guide.

9. Write your senators and representatives urging them to support a strong Endangered Species Act. Let them know why you think it's important. Ask for their opinions and help.

10. Find out if pesticides are sprayed in your community for insect control. What pesticide is used and how does it affect people? Too often, people do not know the results of their actions until it's too late. Some of the information gathered from number two will help with this.

11. Make a list of the products you use from wildlife. Do any of the products come from animals that are threatened. Name an animal that has become endangered, threatened or extinct because it is commercially valuable (like the hawksbill turtle). Don't buy products that come from threatened or endangered species that have been illegally killed. Recycle as much as possible.

12. Visit one of the national wildlife refuges. Quivira, Kirwin, and Flint Hills (or John Redmond) are in Kansas. Some of the refuges have informational specialists who will give you a tour or talk.

13. Attend one of the mid-winter bald eagle counts. There are generally two held in the state each year. (Near Cheney Reservoir and John Redmond Reservoir.)

14. Report violations of wildlife laws to your local game protector. A game protector enforces laws to protect wildlife for all of us.

15. Don't buy exotic wild animals as pets. They may be protected and are not meant to be pets. Keep wild animals wild.

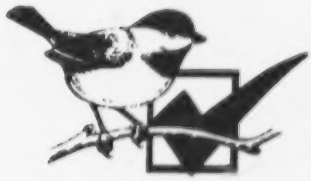
VOCABULARY

How many of these words do you understand now that you've read "Endangered, or Alive and Well Living in Kansas?" Look up words you're unsure of.

extinct
endangered
threatened
wildlife
environment
adapt
species (both singular & plural)
wastes
DDT
exotic
domestic
native
competition
habitat
pollution
pesticide
DDT
prey
colonies

surplus
regulated hunting
license
rate
refuge
wildlife management
laws
migrate
import
export
transport
critical habitat
federal agencies
state agencies
"Chickadee Check-off"
game animals
public support
zoo
market hunters

population
colonists
senators
representatives
nongame
game protector
recycle
legislature
U.S. Fish and Wildlife Service
Lacey Act
Migratory Bird Treaty Act
Endangered Species Act
status
conservation
research
law enforcement
barometer
unrestricted killing
sport hunters



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Wildlife Education Service
Kansas Fish and Game Commission
Box 54A Route 2
Pratt, Kansas 67124

EQUAL OPPORTUNITY EMPLOYER

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KANSAS FISH AND GAME